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THE MICRO USER

Volume 9 Number 4 June 1991 £1.50

THE 100th ISSUE

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- Find out where it's going

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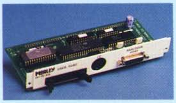

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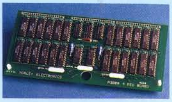

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19,444 pages of Acorn history

Celebrate the 100th issue of *The Micro User* by taking part in our mega-competition with dozens of outstanding prizes from a trip to Paris to Archimedes hard discs and Electron hardware. Turn to Page 40.

Plus we take a look at how the original BBC Micro came into existence and take an informed guess at where it's all heading.

SPECIALS

43 **BlocBusta** ✱
Fight your way through the monsters to escape the dungeons in this multi-level arcade adventure.

65 **Home Brew** ✱
Use this ViewSheet for precise control of the sweetness of your home-made wine.

83 **BBC Demo** ✱
Now 8 bit owners can fight back and bring high quality graphics demos to their own screens.

Type-it-in

This symbol indicates that the feature contains at least one full length listing for you to key in on your micro. ✱

Get it right ✓

All the major listings in this magazine are accompanied by checksums to help you key them in correctly. For full details of how to use them see the article on page 56 of the February 1991 issue.

MICRO USER CLASSIFIEDS

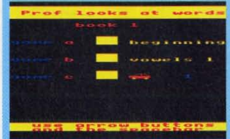
The best bargains in the world of all Acorn micros come from fellow readers of The Micro User. Turn to Page 99 to find just what you're looking for – from cheap modems to complete computer systems.

EDUCATION

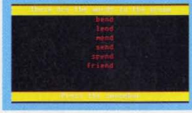
23 **Update**
Up-to-the-minute news of the Acorn range of micros in use in the world of education.

28 **Reviews**
Catch up on the latest software for the BBC Micro series in schools, including:

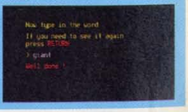
- Fun School 3
- Hands On Spelling
- Eye For Spelling
- Prof Looks At Words



```
Prof looks at words
      book 1
   a    beginning
   b    vowels 1
   c
use arrow buttons
and the spacebar
```



```
        bend
        lend
        mend
        send
        spend
       friend
```



```
Now type in the word

If you need to see it again
press RETURN

> giant

Well done !
```

REGULARS: News 9 ● Mad Hatter 16 ● PD Page 21 ● Bod

THE 100th ISSUE

35 **Back to the beginning**
We interview the co-founders of Acorn computers on the race against time to produce the original BBC Micro.

37 **Back to the future**
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38 **Reminisce**
Who says nostalgia ain't what it used to be? Mike Bibby, first editor of *The Micro User*, reveals some secrets.

89 **Interface**
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91 **Strange attractors**
In the second of our series on this fascinating branch of mathematics we discover a line that goes both ways. *

96 **Analytical Machine**
Unique to *The Micro User*, you make your opinions known in this instant feedback feature.

105 105 **Game Diary**
The everyday story of programming folk: How a commercial game was brought to your micro's screen.

Newcomers

53 **Acorn to PC**
Check out this new book that hopes to fill the gaps and warn against the problems when using the two systems.

101 **!Tracker**
Can this software turn you and your Archimedes or BBC A3000 into a powerful, all-in-one music maker?

107 **Diet Manager**
Overweight or just looking for a healthy diet? Take a look at this package that could help curb your excesses.

Software SCENE

48

We take on a whole new look with a new scoring system and loads more screenshots from every game.

FREE Software

Subscribers to *The Micro User* will receive all this software on disc or tape with this month's magazine:

- *BlocBusta*
- *Duffing Oscillator*
- *Homebrew spreadsheet*
- *Plus all type-in listings*

In addition, those readers with a BBC A3000 or Archimedes series machine will also get:

- *Loads of utilities*
- *Extend Virus Killer*
- *Plus over 900k of PD software*

For new subscribers there's a special gift: A free binder to keep your copies of *The Micro User*.

Find out how to subscribe on Page *103*

NEXT MONTH IN THE MICRO USER

We take a closer look at graphics with a 3D strange attractor, Mode 7 screen editor, sideways scrolling screen utility and a complete CAD package. Not forgetting all our regular features, plus our PD section full of great money-saving ideas.

Building 55 ● Routine Matters 57 ● Problem Solved 61 ● Letters 93

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Chocks Away Extra Missions *(26 extra missions plus some superb enhancements)*	19.95
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The Olympics *(6 Varied Events)*	19.95
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Quazer *(Furious Arcade Action)*	11.95

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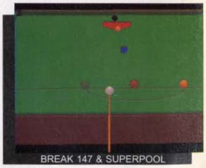
(A flexible, comprehensive and fun speech package)	
Saloon Cars	**June '91**
(The Ultimate Driving "Game-ulation"! combining the best features of a fast and furious racing game with the realism of an accurate driving simulator)	
Break 147 & Superpool	**June '91**
*('Real' snooker & pool simulator **par excellence**)*	

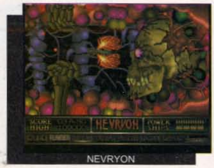
SALOON CARS

COBBLERS
SHOES REPAIRED WHILE-U-WAIT
GUMSHOES

CHOCKS AWAY EXTRA MISSIONS

MOTORS
POINTS
DAMAGE
BOOGIE BUGGY


BREAK 147 & SUPERPOOL



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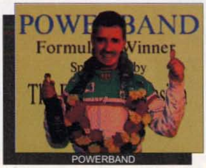
CHOCKS AWAY



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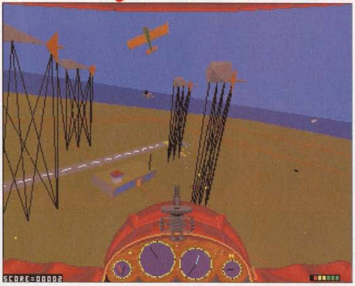
BBC A3000 / ARCHIMEDES / BBC A3000 / ARCHIMEDES / BBC A3000 / ARCHIMEDES

Chocks Away Extra Missions



CHOCKS AWAY

This new updated Mark II Chocks Away with supersmooth animation really is flight simulation the way you've always wanted it. It has everything for the beginner and the expert:

- Beautiful 256 colour graphics and 'nerve shattering' digitised sound effects
- Easy to fly, yet highly manoeuvrable bi-plane - ideal for all ages/skill levels
- **Revolutionary 2 Player Option** using split screen display. This allows 2 players to each fly their own planes simultaneously in practice, dogfights, or missions
- Full joystick, dual joysticks, mouse and keyboard control options
- **Amazing "Black Box Flight Recorder"** included so that you can record your own flights and then save & replay them. 90 minutes of totally absorbing pre-recorded training flights are included with the game
- Internal/External views of your plane can be selected from front/rear/left/right
- Powerful 30mm canon capable of very rapid fire and long range destruction
- Easy to read instrument panel and simple controls
- 3 very varied immense maps to explore - approximately 18000km^2 in total
- 20 fascinating and varied missions of increasing complexity are included with a promotion system from Cadet right through to Marshal of the RAF
- Superb range of targets/enemies including bombers, triplanes, fighters, tanks, control towers, anti-aircraft guns, head quarters and patrol boats

Chocks Away Mark I Version was awarded **GAME OF THE YEAR 1990** by **Acorn User, A&B Computing (now Archimedes World), RISC User & Micronet**

"Graphics in the game are superb, smooth and with plenty of ground detail... this is a really enthralling flight simulator with plenty of variation and features to ensure longevity." **RISC User, Dec '90**

"Chocks Away is a delightful game." **Archive, Jan '91**

"Chocks Away is a brilliant game." **BBC Acorn User Dec '90**

"... It's a really great game, Playability 10. Value 10." **The Micro User, Jan '91**

"**(Chocks Away Mark II Version)**... The increased speed obviously makes the game more responsive and fun to play, well and truly overtaking Interdicter II as the best Archimedes plane game." **New Computer Express, Feb '91**

CHOCKS AWAY EXTRA MISSIONS

This consists of a new manual and a disc containing an additional 26 missions (6 of which are reconnaissance missions). It is loosely based on the original Chocks Away and features an extensive range of extra features and improvements. To run it, you will require the MkII version of the original Chocks Away. Extra features include:

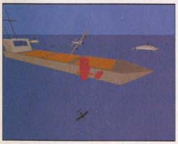
- 16 new & detailed maps based over land and sea.
- 20 enemy planes and 20 enemy targets are included in each mission. Over 1000 extra targets and planes have been carefully defined.
- Considerably improved action on all missions with plenty of targets to shoot at and plenty shooting at you.
- You can view the action from any of the enemy planes or targets and your own control tower at any time even while still controlling your own plane or watching a saved flight. There is a selection of tracking cameras (with adjustable zoom lenses!) around the playing arena. In addition a phantom plane can also be selected to follow the action on any or your black box flight recordings.
- Improved enemy pilots capable of performing loops, rolls, stall turns etc. All enemy planes are carefully modelled using the same equations controlling your own plane. This ensures both an accurate and fair simulation.
- More enemy planes and targets to shoot including: Three Engine Fighters, Enormous Cargo Planes, Airships, Barrage Balloons, Gun Boats, Oil Tankers, Trains etc.
- Six reconnaissance missions where you are required to take photos of various installations with your new on board camera.
- Improved graphics over the 16 maps including Complex Cities, Houses, Railways, Roads, Rivers, Bridges, Lampposts, Railway Stations, Oil rigs, Piers, Beaches, etc. to mention but a few. In total over 100 different graphics have been defined.
- Serial Port Link Up option so that you can link up 2 BBC A3000 or Archimedes computers and 2 pilots can fly simultaneously in full screen mode.
- Extensive enemy flak guns and improved enemy plane guns help make the new missions both more interesting and challenging to say the least!
- Improved digitised sound effects plus, of course, all the extensive options which are available with the original Chocks Away.

WIN a superb......

"Radio-Controlled Biplane"

Successful completion of all 6 Reconnaissance missions will allow you to enter this competition

TALLY HO GINGER!



ARCHIMEDES & BBC A3000

All versions are compatible with the BBC A3000 and 310 & 400 Series

CHOCKS AWAY (Mark II Version with 1 or {split screen} 2 player options)	£24.95
CHOCKS AWAY EXTRA MISSIONS (With 2 player Serial link option)	£19.95
CHOCKS AWAY COMPENDIUM (Chocks Away & the Extra Missions)	£39.95
CHOCKS AWAY NETWORK (Econet and Eclipse Midi Podule - Ring for availability & Price)	

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This highly professional DTP and Wordprocessing system for the Archimedes & A3000 is now available. Ovation is without doubt the most sophisticated and exciting piece of software yet released by Beebug and we are confident that you will be addicted as soon as you try it.

Its ease of use, instinctive feel and full feature list make it excellent value at only £116.33 (inc. VAT). If you are considering purchasing a Wordprocessor or DTP package, or you are unhappy with your current set-up, we recommend that you seriously consider Ovation.

But don't just take our word for it!

We are so confident that you will be impressed with Ovation that we have produced a demonstration version to enable you to evaluate it for yourself. It has most of the features of the full version allowing you to really get a feel of how easy Ovation is to use. It is even supplied with a mini manual to get you started. However, you will not be able to save your files to disc and all print-outs are marked "Demonstration."

The cost of this demonstration version is just £5.00 inclusive of postage. And if you then decide to buy Ovation, we will refund the £5.00, and you can still keep the disc.

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Please send me 1 Ovation demo disc at £5.00 inclusive of VAT and postage. Stock Code: 0114

Please debit my Access/Visa/Connect Account no.

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Telephone: 0727 40303 Fax: 0727 60263

NEWS BEAT

Archimedes comes of age – in colour

ARCHIMEDES users who struggle with the fixed 256 colours available on their machine may often dream of having endless colour options when it comes to advanced design or DTP work.

That dream has now become a reality, thanks to The Serial Port and QD Enterprises (0243 531194) who have jointly produced a graphics enhancer offering the choice of 256 colours from a full 24-bit palette of 16.7 million.

The software supplied with the expansion card replaces the colour module allowing all properly written software to integrate perfectly with the new, more colourful, environment.

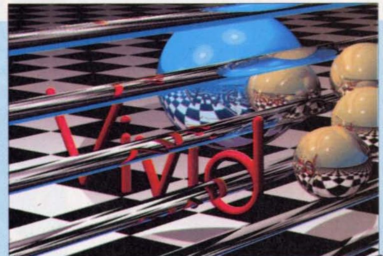
Almost every screen mode from 30 to 127 has been defined, and ones invented by other third parties such as Computer Concepts and Beebug have been included for compatibility. Also to be included is a special screen mode script language allowing users to create mode descriptions as text files and have them compiled into short data blocks that are easily loaded by the system.

The palette software has been extended to allow each of the 256 colours to be redefined.

Colours can be used at resolutions of up to 768 x 299 on a standard monitor and 832 x 328 on a muilti-sync.

A true 256 grey scale can be obtained through such other modes as 512 x 512 and 640 x 480 in the DeskTop. Outside the DeskTop, modes are available using up to 65,536 colours.

One stumbling block is the built-in Archimedes sprite system that just isn't designed to handle 24 bit colour: "We have adopted the clear file format created by John Kortink, author of public domain programs !Translatr, !MakeTIFF and !MakeGIF", said a spokesman for The Serial Port.

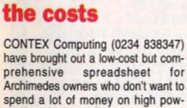


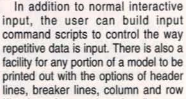
"It's very simple and allows us to load and save our colour files. Acorn does intend to adopt the TIFF picture format as standard but they haven't sorted this out yet".

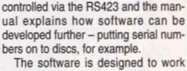
The complete system has been developed in close association with Acorn in order to maintain compatibility with any future changes, including the release of the VIDC2 screen controller chip some time next year. While existing Risc OS compliant software will work with the new board, new software is needed to really use it to the full.

Eight of the new boards are currently with third party software developers, including the author of Clares' new ray tracing package, to ensure that the powerful hardware isn't released into a software vacuum.

Adding such a board will provide a whole new dimension to the machine's graphics capabilities – and the cost, fitted, is a mere £179.







Spreading the costs

CONTEX Computing (0234 838347) have brought out a low-cost but comprehensive spreadsheet for Archimedes owners who don't want to spend a lot of money on high powered, multi-tasking packages.

The Spreadsheet Mk V is a Risc OS conversion of their BBC Micro spreadsheet. It features a number of options including programmable print command and input script files, models up to 26 columns by 99 rows and a colour option.

In addition to normal interactive input, the user can build input command scripts to control the way repetitive data is input. There is also a facility for any portion of a model to be printed out with the options of header lines, breaker lines, column and row IDs plus column and row headings.

Initial release price is £15 including a printed manual. After stocks of the manual run out, it will be included as a text file on disc. Existing users of the BBC Micro version can uprade for £6.

Discs by the dozen

NORWICH Computer Services (0603 766592) have launched an auto-loading disc copier which will run from any Archimedes computer. Needing a minimum of just 1Mb, it will copy 40 discs an hour – leaving them correctly formatted for the Archimedes.

The package includes an auto loader which can take 50 discs at a time, a 3.5in drive, an external disc interface, an Archimedes-to-auto loader RS423 cable, a disc drive cable, a power lead and the Archimedes-based software.

Its auto-loader behaves as an external drive with a loading meachanism controlled via the RS423 and the manual explains how software can be developed further – putting serial numbers on to discs, for example.

The software is designed to work with all Archimedes disc formats and because it uses bit-copying techniques, it is also possible to copy some other formats.

To work on a 1Mb machine, the

➤

ARCHIMEDES
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software abandons the DeskTop in order to grab enough memory to hold the complete contents of the master floppy disc. This allows the system to be completely floppy disc-based. Copies can also be made on a one-off basis and the same copier can be used for 5.25in discs. Price: £2,750 including VAT.

Affordable Midi sampler

THE Serial Port (0243 531194) are claiming that their new sampler combined with Midi card has one main advantage over most others – it's affordable. Costing £69, the card will fit into the Econet socket and for £10 more, a podule version is also to be launched in June.

An 8-bit sampler with variable rates, the board is capable of sampling at up to 250KHz with input via a 3.5mm jack, allowing it to be connected to hi-fi equipment, CD players and Walkmans.

The software supplied will support a range of features including oversampling, sample rate conversion and software filtering.

Waveform editing is possible with facilities to view the waveform, fade in and out, cut and paste. Installation is easy and neat with no unsightly leads protruding from the machine. All leads connect via an adaptor, directly to the standard Econet socket. Samples produced can be used with another Serial Port product – Tracker. This 8-track sequencer can produce tracks without the need for an additional keyboard and all tracks created can be replayed on a standard Archimedes.

It costs £49.95 but can be bought as a package with the sampler/Midi card for £99.95.

"The Serial Port, in conjunction with QD Enterprises, are going through a large expansion phase", said director Andrew Foyle.

"Not only are we launching a large range of Archimedes products but we are also opening a new distribution and service centre in Westbury, Wiltshire. It will run in addition to the present sites at Burcott Manor, Somerset and in Chichester".

Other new products due out soon will include a range of low cost drive upgrades using SCSI and IDE interfaces and ranging in price from £259 for an internal 40Mb IDE system and a new version of the communications program Arcterm 7 including Minitel emulation and other new features.

The Archimedes in control

ARCHIMEDES computers could play an increasingly important role in running production lines, automating scientific experiments or taking over aids for the disabled.

These are just a few of the openings for Arachnid, the latest control language from Paul Fray Control Systems (0223 441134).

Arachnid provides a real-time programming environment for the Archimedes and is based on Spider, Fray's established real-time extension for BBC Micros.

As well as simplifying the task of controlling apparatus, it allows the programmer to specify events of interest and the action to be taken when they occur.

This facility means that several processes can be run quite independently of each other.

Supplied on a 3.5in floppy disc, Arachnid allows programs to respond to external events such as switch closures and it enables a number of independent intervals to be timed concurrently.

The relocatable module provides system calls for the manipulation of a wide range of I/O. In addition, a large Basic library of procedures and functions is provided as a front end to the module.

Facilities include monitoring and control of digital, serial and analogue I/O, the keyboard (including function keys) and internal timers, counters and flags.

Arachnid makes use of whatever I/O it can find. With a podule fitted, control of the user port and analogue port is available, together with the function keys and keyboard and up to 256 centisecond timers, 256 internal counters and 256 internal flags. In addition, Arachnid can be used with a range of interface cards from Paul Fray.

"There are now some 70 of our systems in use around the world in applications as diverse as satellite tracking, remotely operated undersea vehicles and drug testing", said Paul Myers, sales manager for Paul Fray.

Arachnid costs £100 plus VAT.

Mega bundle

FOURTH Dimension (0742 700661) have bundled together a massive 3D mega game, an arcade isometric game and two multi-player sports games for their latest compilation – The Real McCoy 2.

All in their original formats with full instructions, they are Apocalypse, the futuristic Gordon Key game written specially for the Archimedes; Golf favourite Holed Out complete with two courses, 3D graphics and sound effects, also by Gordon Key; The Olympics which takes in diving, shooting, javeline, swimming, canoeing and pole vaulting and Inertia, the tantalising arcade offering.

Apocalypse

Bought individually at full price they set you back £89.90. The Real McCoy 2 costs £29.95.

Recording program updated

A NUMBER of new features are now available for Studio24 Plus, the Archimedes-based recording program from Electromusic Research (0702 335747).

Provided as a straight disc upgrade for existing users, they include the ability to add textual marks and fingering and to insert unlimited loops within a track.

Up to 23 tracks can also be merged on to a single track, responding to dynamics and retaining original channel information or diverting to a specified channel.

The realtime scoring feature now appears in song mode with very fast selection of recorded tracks during performance.

For speedy editing in graphics and drum edit pages, the user can cycle round an area or see the track move along until another editing area is found. Editing notes in the Score page has also been improved by sounding the note or chord selected.

A unique music ruler lets the musician drag a note's position over a snap grid of note divisions, making selection of even complex time groups simple.

EMR claim to have produced the first program which allows users to see what they want to and still hear the original recorded music – a particularly important feature for jazz musicians.

A new waveform filing system loads as an icon bar utility into which sounds can be dragged at any time. There is also a printout facility for guitar chords.

The Studio24 Plus Version 2 disc costs £189 including VAT or £89 for existing users upgrading from version 1.

New shape, new name

DATABASE Publications, the company that brings you *The Micro User*, has changed its name to Europress Publications. This is part of the restructuring of all companies within the Europress Group

Chairman Derek Meakin, who founded the group 21 years ago, said: "With the creation of new subsidiaries in recent years, all with different names, there was a growing danger of the parent group losing its identity.

"From now on all companies forming part of the group will appear under the Europress banner".

Production editor Peter Glover has been promoted publisher, with responsibility for *The Micro User*, *PC Today* and *Let's Compute!*

Other key *Micro User* personnel are features editor Steve Turnbull, art editor Tym Leckey, marketing manager John Weir and circulation director John Burns.

Derek Meakin

Peter Glover

Said Peter Glover: "These changes coincide happily with the relaunch of our bigger, brighter *Micro User* and reflect the company's drive to build on *The Micro User*'s pre-eminent position in the Acorn computing world".

Other company name changes include Europress Interactive (was Interactive Publishing), Europress Software (Database Software) and Europress Trade Publications (Specialist Retail Press).

Michael Meakin becomes managing director of the group's holding company, Europress Ltd, with Tim Roberts promoted to group financial controller.

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- and other exciting and useful items

The most popular subscription magazine devoted solely to the Archimedes range of computers including the A3000.

RISC User offers 10 magazines a year which typically contain:

News on the world of Archimedes
Reviews of the latest products
Ready to run applications
Utilities, routines and advanced programming techniques
Programs and articles on sound and graphics
Series of articles for all spheres of interest:
- 'Into the Arc' — tutorial series for beginners
- 'Mastering the Wimp' — series on Wimp programming
- 'Under the Lid' — hardware series
- 'Assembler Workshop' — all about ARM Assembler
- 'Beginning 'C' — series on C language
- 'DTP/WP' — advice on using commercial software
- 'Arcade' — a round-up of the latest games

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RAF calls up the Arc

ARCHIMEDES computers have been brought into play to test eye, hand and foot co-ordination among RAF pilots and aircrew.

Acorn have won a £230,000 contract to supply 48 machines to the RAF Officer and Aircrew Selection Centre at Biggin Hill. They will be linked into an Econet network to run specialised Ministry of Defence software which puts crews through a series of psychometric aptitude tests.

The Arcs will measure responses from rudder pedals and desk-mounted keyboard/joystick assemblies. RAF and MoD staff will then conduct complex data analysis of the results through a Unix connectivity feature built into the system package. The programme is due to start in June.

"This installation, in conjunction with MoD software, has great potential as a replacement for systems already used by commercial airlines in the selection of their aircrew", said Tim Holland-Smith of Acorn.

"It also offers a customised solution in the broad area of psychometric testing for personnel selection where Acorn – via value added reseller Psytech – already has a substantial present with Archimedes-based systems.

"This yet again, amply demonstrates the suitability of Acorn equipment for specialised applications in the industrial and commercial world".

Beating the Budget

INCREASES in VAT will not put up the cost of Learning Curve packages, thanks to a budget beating exercise by Acorn. The ex-VAT price of the bundle has been reduced so that the total cost to the consumer remains at the pre-Budget level.

In addition, Acorn are introducing a zero per cent financing deal on Learning Curve systems giving buyers the opportunity to spread the cost over 12 months at no extra charge.

Learning Curve packages include either an Archimedes A420/1 with 20Mb hard disc or a BBC A3000 with floppy drive, bundled with a selection of software including a word processor, an advanced database, a PC emulator and a range of applications.

Under Acorn's new arrangements, an A3000 Learning Curve remains at £799 and an Archimedes package stays at £1,489 including VAT. Under the monthly repayment scheme, the A3000 version costs £59 a month and the Archimedes, £109 a month.

Grass on that virus

ARCHIMEDES owners can now help in the fight against computer crime by sending New Scotland Yard's Computer Crimes Unit details of any viruses which may have affected their machines.

And through *The Micro User*'s recent article on viruses written by Clive Gringras, both Clive and his fellow virus-buster Warren Burch are now the unit's official advisors on Archimedes viruses.

"Thankfully, the Archimedes' youth and the overall responsibility of its users have ensured that very few Archimedes viruses have been distributed", said Clive.

"However, if the problem is going to be tackled, it should be attempted early. Anyone who has been afflicted by a virus should send full written details and if possible a disc containing an isolated copy of any files that have been infected".

The man with responsibility for viruses at the Computer Crimes Unit, DC Noel Bonczoszek, added: "Under Section 3 of the Computer Misuse Act, unauthorised modification of a computer done with intent is a crime, and that includes releasing viruses.

"There are some places where people have the regular job of clearing viruses out of their systems. They treat it as a chore and just expect to clear up the mess but they should report it to us.

"On the face of it, finding out how the virus entered a system and wether it was introduced with intent seems like a pretty hopeless task but unless we have information about it, we will never get anywhere.

"We are collecting the names of a number of experts on various machines so that when viruses do occur, we will not be caught on the hop".

All suspect files sent to the unit should be in a directory called Infection and should have their file types set to Text (FFF). Any other details such as when the infection took place or even the source of it may help police to identify the virus writer.

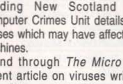
If they wish, people sending in details of viruses can remain anonymous. Packages should be clearly labelled Archimedes Virus and sent to The Computer Crimes Unit, 2 Richbell Place, London, WC1 8XD.

Acorn's new money man

NEW Director of Finance at Acorn Computers is Gary Johnson who has joined the company from Siemens Nixdorf Information Systems where he has been UK financial controller for the last five years.

Before that he worked in a company which sold high-tech equipment to Eastern Europe.

"Gary brings to Acorn strong financial skills allied to a thorough understanding of the role of computer technology", said Acorn's



managing director Sam Wauchope. "We are delighted that he has joined our team".

Birthday prize winners

PAUL Van Reenen of Southbourne is the winner of a BBC A3000 Learning Curve bundle generously donated by Acorn to help *The Micro User* celebrate its 8th birthday. He won first prize in our Birthday Bonanza competition featured in the March issue.

Prizes worth more than £1,300 also included a set of useful sofware packages for the eight runners up. They go to D. E. Cahill, Great Barr (Desktop Office); Ronan Doyle, Tytherington (System Delta); C. Delaney, Rainworth (Inter-Word); Kris Wise, Stoke Gifford (Impression II); Mark Richardson, Barking (Interdictor II); Louise Glass, Alwoodley (Interdictor II); Jean Shields, Belfast (Rhapsody) and William Girdlestone, Gateshead (Beta-Base).

Computer Concepts would like to point out that the price of ShowPage, reviewed last month, is £173.35 not £73.35 as shown

Computer chatline opens up

A NEW Archimedes/A3000 slant on Superior Software's old speech generator for the BBC Micro is hot off the production line of Dave Hoskins – the man responsible for the original program.

Called Speech! it uses the standard sound interface with no extra hardware needed and leaving your computer free to do other things while it chats away to you.

Users can vary the pitch, speed, volume and voice either directly or in their own word files and programs and can even sing the words over a four octave range.

Fully Risc OS compatible for multitasking, Speech! has an unlimited vocabulary with an inbuilt parser which translates words into phonemes. This allows stress and intonation to be added to words input directly and even copes with foreign languages.

Also included are the option of adding to or modifying the pronunciation exception dictionary and a special spelling test feature.

On an Archimedes/A3000 3.5in disc, Speech! costs £19.95. BBC Micro versions have also been re-released at £9.95 on cassette, £11.95 on 5.25in disc and £14.95 on Master Compact 3.5in disc.

Steve Hanson of Superior (0652 58585) also has some good news for fans of his Master Break snooker-style trivia package. Built into the program is the option for extra questions and later this year, Superior may be selling extra sets for under £10.

"This could turn Masterbreak into a useful education program", said Steve. "There is nothing to stop specific sets of questions being produced for particular education needs.

"If, for example, primary schools wanted questions with a high graphics content, extra discs could be added with up to 500 questions. If extra sets are purely text-based, they could include more than 2,000 questions in addition to the 2,100 already in the program. This makes Master Break a very flexible package".

Discs problem

PROBLEM Solved in the May issue contained a letter from Paul Cina regarding difficulties he was having with his discs. Watford Electronics would like to point out that the problems he experienced did not result from the disc drive that Paul bought from them, but from the one he was replacing.

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Econet Network Board	£45
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Software Developers Toolbox	£147
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2 Podule Backplane	£24
4 Podule Backplane	£37

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20Mb for 410 ST506	£165
40Mb for 410 ST506	£259
88Mb for 410 ST506	£379
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or	Taxan 775 Monitor (Entry System)
or	Star XB-2410 24 Pin Colour Printer (Colour System)
A540/1	High Resolution 14" Multiscan Colour Monitor + Panasonic KX-P1180 Printer & Connecting cable
or	Taxan 795 or 775 Monitor (Entry System) or Star XB24-10 24 Pin Colour Printer (Colour System)

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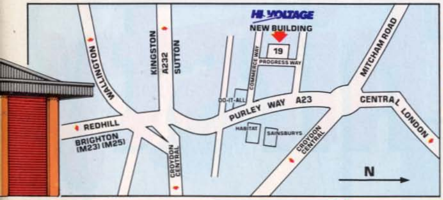

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MU6

Thirsty

The Mad Hatter gets to the bottom of the bottle in a far from dry adventure

THE third Melbourne House adventure has kept a steady flow of questions coming into my mailbag. *Dennis through the Drinking Glass* still provides a chuckle even though it is a number of years old now.

I guess it has something to do with a certain ironclad lady who used to run the country. I suppose the gameplay can best be summed up as: ***How to avoid sobering up while keeping out of HER way.***

You start off in a cosy room in Number 10, safely hidden from Maggie's eagle eye, while you plan your getaway in order to drink the cellar dry. It's a nice room with a chair, a desk, a bed, a wardrobe, a bookcase, an Adam fireplace and a picture of that redoubtable warrior, Winston Churchill.

Go north to the lobby and north again under the stairs where you can see a Purdy shotgun, some golf clubs and a piece of cheese. You'll hear these chilling words: *Show yourself Dennis, be sure you'll be found.* Fret not: Hide instead until you hear Maggie go out.

Take the golf clubs and move back south to the lobby, then east and north to the master bedroom, where there is a wardrobe, table, double bed and plant pot. Examine the pot to reveal the flask, take flask and drink. From now on you must drink about every 10 moves or you will sober up – with unfortunate consequences.

Next examine bed to find the sheets, take sheets and then examine wardrobe to disclose the radiation suit.

Take it. Now go east to the bathroom and examine tumbler to see your teeth. Take teeth, wear teeth and go west back to the master bedroom and drink. Very daringly, go south to Maggie's den then west to the lobby and up to the servants' quarters, where you'll see some Cherry Blossom polish. Take it and go down to the lobby again.

Back to Maggie's den where you should drop the sheets and the golf clubs before examining the wardrobe. You should now see plusfours, sheets and a suit. It's time to drink again.

Take and wear the suit and then examine the desk to see a letter: Take it and go north to the lobby. Now go west out into Downing Street where a policeman will offer you a ticket. The correct response is: Buy Ticket.

After that charitable act proceed in a north-easterly direction to Whitehall – you'll see a little cloth bag – and then plod your way north to Soho where a French model has hung up her sign. Have a drink while you ponder Life, the Universe and French models.

Time to go north to a Chinese restaurant, where you must buy a meal before going back south to Soho. If you go east from here to the private eye's office and hand over the letter you'll be offered a truss and a bottle of port in exchange: Take them.

Now go back west to Soho, up to Fifi and Roxanne, and have a convivial drink. Drop the ticket, take the wig and run down the stairs to Soho and continue south to Whitehall.

There you are confronted by Norman Fowler who is determined that you shall not pass. If you debag Norman (remember the polish?) you'll find that things look altogether different. Not only that, you'll see a pill.

Off you go north again, back to the Soho staircase and the east to Fleet Street. Don't forget to smile for the cameraman. You'll also see Jimmy Saville jogging with the Archbishop of Canterbury.

Entering turn should indicate that you have had 59 moves. It's time for a drink.

(Continued next month)

Northern frights

I left readers in the brick building at the initial location of **Adventure Quest** ready to start out on the adventure proper, having solved the chaining puzzle that resulted in getting the talisman and Pan pipes. We also found a silver ball – most improbably stuck up an oak tree.

The question that now needs answering is this: What items do we take on our travels? In **Adventure Quest** you can only carry four items at a time, so we've got to choose carefully.

The following things are available: The talisman, pipes, sling, ball, keys and bottle of water. The table was abandoned once it had been used to get the orchid which tamed the unicorn and we ate the onion/garlic.

For reasons which will not be at all obvious at this stage, we leave the Talisman behind together with the pipes and take the sling, ball, keys and the bottle of water.

Beginners should notice that whenever a bottle of water is provided it is usually – though not always – an indication that periodic drinks will be needed to avoid dying of thirst in certain sections of the game.

Sometimes it is needed to water a plant, and only rarely is it a red herring. So whatever else is neglected, never leave water behind until you are absolutely sure you won't want it.

Once out of the building we turn our faces to the north and set out on our adventures. One thing soon becomes apparent: We are heading into a desert – which also happens to be a maze – and mortal danger.

It's confession time: I tackled this adventure in my beginner's stage, and I got into trouble on two counts. I couldn't solve the maze, and I kept on getting killed. In the end I had to phone Pete Austin and ask him what to do.

Five moves north puts you smack in the middle of the trackless wastes

work

and somewhere about that time you will be told that noises can be heard. A clue was hidden in the last location description before the desert proper began. It mentioned *endless dunes marching northward.*

I made some correct – and some false – assumptions here: I am a long-time fan of Frank Herbert's novel Dune, and it didn't take me long to realise that the noises indicated the approach of a giant sandworm.

I thought it was a means of transport and spent ages getting killed while I tried to figure out how to jump aboard and ride it.

In fact the worm has another use, as we'll see. First move west and then north again to an oasis. The final moves are three to the east and this puts you on a rocky outcrop next to a pyramid guarded by the Sphinx.

Timing is crucial here and the way to avoid being swallowed up by the sandworm is to pause at some point during its approach. Those familiar with Dune will realise that this emulates the broken rhythm of walking adopted by the Fremen.

Being an early adventure, the parser in **Adventure Quest** doesn't recognise the command WAIT, but LOOK serves just as well.

What you have to do is to proceed in such a way that you are one move away from the rocky outcrop and simultaneously one move from being devoured by the sandworm. Then as you step on to the rocky outcrop and safety the worm rushes up and devours everything in its path – and that includes the Sphinx.

One other thing should be noted about the desert area before we finish this session: If you move north, east and east from the edge of the desert you will find a black pillar with another of those enigmatic white dots on it.

All I will say for now is that you'll find it useful to have some basic moves in the desert area thoroughly worked out.

(More next month)

Hatter's Helpline

Warrant Officer Bill Bailey spotted David Waine's need for help in the Prestel adventure **Flight of the Unicorn** and has kindly sent in a full solution.

What David needs to do at the gates with the ear is to wear the ring and say TOAD, which is an anagram of *A DOT* – the clue given by the raven. Thanks Bill.

I have been approached by a reader who used to subscribe to Electron User and who was stuck in Geoff Larsen's adventure **Wychwood.** It's the old bull problem: In this case, the trick is to wave the red flag to enrage it, move south and *then* throw the flag. The tree can now be climbed.

Incidentally, I am more than happy to offer help to former Electron User adventurers – that's why Pendragon passed on his files to me.

W. J. Murphy has some very useful information for owners of Master 512 micros. The following Sierra adventures will work, he says: Police Quest, Kings Quest 4 and Leisure Suit Larry's 1 to 3. They will also work on an Archimedes running the PC emulator but more slowly.

I'm not normally devoted to arcade adventures – I'm getting too old and fumble-fingered according to my sons – but I bought Twin World for my youger lad at Christmas. I think it's brilliant – and so does he. At the time of writing, he's reached level six while I'm still plodding around level one.

Elite Tips

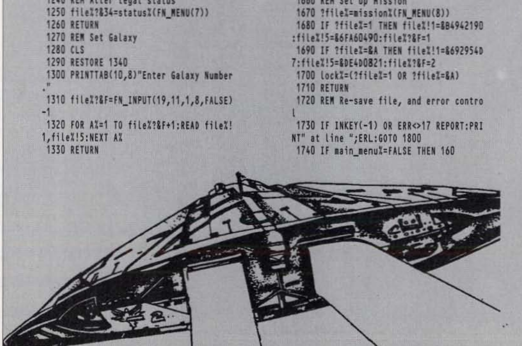
Here – at last – is the **Elite** cheat as promised: It's a reprint from our February 1986 issue.

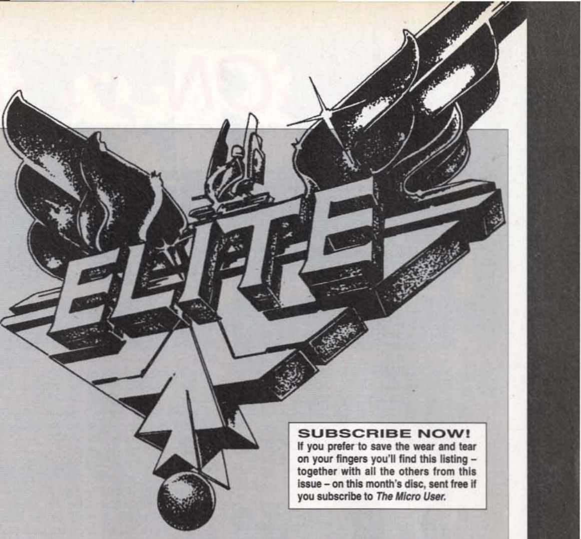
```
   10 REM ################
   20 REM #  ELITE CHEAT  #
   30 REM ################
   40 REM #      By       #
   50 REM # Stuart Menefy #
   60 REM #      (C)      #
   70 REM #   The Micro   #
   80 REM #     User      #
   90 REM ################
  100 MODE 7
  110 PROC_screen
  120 PROC_init
  130 PROC_assemble
  140 PROC_load
  150 ON ERROR GOTO 1730
  160 REPEAT
  170 ON FN_MENU(1) GOSUB
880,950,1140,1
160,1220,1250,1280,1430,1670
  180 UNTIL FALSE
  190 DEF PROC_screen
  200 FOR A%=0 TO 1:VDU
31,0,A%,134,157,
129,141,31,15,A%:PRINT"Elite
Cheat":NEXT
 A%
  210 VDU 28,0,24,39,2
  220 VDU 23,1;0;0;0;0
  230 ENDPROC
  240 DEF PROC_init
  250 @%=0
  260 *FX4 1
  270 DIM memory% 40,file% &100,check%
1
00
  280 DIM
entries%(8),menu$(8,9),details
$(8,9),laser%(6),rating%(9),status%(3-
),m
ission%(5),cargo$(17)
  290
X%=&70:Y%=0:A%=0:file_system%=USR(
&FFDA) AND &F:REM Read which filing
syst
em is in use
  300 REM Set file to commander Jameson
  310 FOR A%=0 TO &FF STEP
4:A%!file%=0:
NEXT A%
  320
!&70=1E3:file%!&B=&446E803:file%?&
10=&F:file%?&16=&16:file%?&33=3
  330 file%!1=&5A4AAD14:file%!5=&B753024
8
  340 lock%=FALSE
  350 REM Read in data
  360 FOR A%=1 TO 6:READ laser%(A%):NEXT
 A%
  370 DATA 0,&F,&8F,&32,&97,&FF
  380 FOR A%=1 TO 9:READ rating%(A%):NEX
T A%
  390 DATA 0,8,&10,&20,&40,&80,&200,&A00
,&1900
  400 FOR A%=1 TO 3:READ status%(A%):NEX
T A%
  410 DATA 0,1,50
  420 FOR A%=1 TO 5:READ mission%(A%):NE
XT A%
  430 DATA 0,1,2,&A,&E
  440 FOR A%=1 TO 8
  450 READ entries%(A%),details$
  460 FOR B%=0 TO entries%(A%)
  470 READ menu$(A%,B%)
  480 IF details$="I" AND B% READ detail
s$(A%,B%) ELSE IF details$="N" THEN deta
ils$(A%,B%)="N" ELSE details$(A%,B%)=det
ails$
  490 NEXT B%,A%
  500 IF file_system%<>4 THEN entries%(1
)=7
  510 FOR A%=1 TO 17:READ cargo$(A%),fil
e%?(A%+&34):NEXT A%
  520 ENDPROC
  530 DATA 9,I,Main Menu,Set Money,!&70/
10,Alter Equipment,N,Alter Lasers,N,Set
Number of Missiles,file%?&33,Set Rating,
FN_RATING,Set Status,FN_STATUS,Set Galax
y,file%?&F+1,Alter Cargo,N,Set Mission,F
N_MISSION
  540 DATA 9,I,Alter Equipment,Fuel,(fil
e%?&D)/10,Cargo Bay Size,(file%?&16)-2,E
CM System,FN_GOT(file%?&28),Fuel Scoops,
FN_GOT(file%?&29),Escape Capsule,FN_GOT(
file%?&2E),Energy Bomb,FN_GOT(file%?&2A)
,Energy Unit,FN_ENERGY
  550  DATA Docking Computer,FN_GOT(file
%?&2C),Galactic Hyperspace,FN_GOT(file%?
&2D)
  560 DATA 4,N,Energy Unit,Not Present,N
ormal,Naval,Cheat
  570 DATA 6,N,Laser Type,None,Pulse,Bea
m,Mining,Military,Cheat
  580 DATA 4,FN_LASER,Laser Position,Fro
nt,Rear,Left,Right
  590 DATA 9,N,Combat Rating,Harmless,Mo
stly Harmless,Poor,Average,Above Average
,Competent,Dangerous,Deadly,E L I T E
  600 DATA 3,N,Legal Status,Clean,Offend
er,Fugitive
  610 DATA 5,N,Mission Menu,Before Missi
on 1,During mission 1,After mission 1,Du
ring mission 2,After mission 2
  620 DATA Food,&10,Textiles,&F,Radioact
ives,&11,Slaves,0,Liquor/Wines,3,Luxurie
s,&1C,Narcotics,&E,Computers,0,Machinery
,0,Alloys,&A,Firearms,0,Furs,&11,Mineral
s,&3A,Gold,7,Platinum,9,Gem-Stones,8,Ali
en Items,0
  630 DEF PROC_assemble
  640 FOR PASS%=0 TO 2 STEP 2
  650 P%=check%
  660 [OPT PASS%
  670 LDX #&49
  680 LDA #&49
  690 CLC
  700 .check_loop
  710 ADC file%-1,X
  720 EOR file%,X
  730 DEX
  740 BNE check_loop
  750 STA file%+&4B:EOR #&A9:STA file%+&
4A:RTS
  760 ]
  770 NEXT PASS%
  780 ENDPROC
  790 DEF PROC_load
  800 PRINTTAB(9,9)"Do you want to load
a"
  810 PRINTTAB(7,12)"previous commander"
;
  820 IF NOT(FN_YES_NO) ENDPROC
  830 PROC_oscli("LOAD "+FN_FILENAME+" "
+STR$~(file%))
  840 FOR A%=0 TO 3:A%?&70=file%?(&C-A%)
:NEXT A%
  850 IF ?file%=1 OR ?file%=6 OR ?file%=
&A THEN lock%=TRUE
  860 ENDPROC
  870 REM Alter Money
  880 CLS
  890 PRINTTAB(9,9)"Enter how much money
```

➤

➤

```
  900 PRINTTAB(13,12)"you require."
  910 !&70=FN_INPUT(14,15,10,&CCCCCCC,TR
UE)*10
  920 FOR A%=0 TO 3:file%?(&C-A%)=A%?&70
:NEXT A%
  930 RETURN
  940 REM Alter Equipment
  950 REPEAT
  960 ON FN_MENU(2) GOSUB 980,1020,1060,
1070,1080,1090,1100,1110,1120
  970 UNTIL FALSE
  980 CLS:PRINTTAB(7,9)"Enter how much h
yperspace"
  990 PRINTTAB(13,12)"fuel you want."
 1000 file%?&D=FN_INPUT(17,15,4,25.5,TRU
E)*10
 1010 RETURN
 1020 CLS:PRINTTAB(10,9)"Enter cargo bay
 size"
 1030 file%?&16=FN_INPUT(18,11,3,253,FAL
SE)+2
 1040 RETURN
 1050 REM Toggle various bytes, and item
s of eqipment
 1060 file%?&28=NOT file%?&28:RETURN
 1070 file%?&29=NOT file%?&29:RETURN
 1080 file%?&2E=NOT file%?&2E:RETURN
 1090 file%?&2A=file%?&2A EOR &7F:RETURN
 1100 file%?&2B=FN_MENU(3)-1:RETURN
 1110 file%?&2C=NOT file%?&2C:RETURN
 1120 file%?&2D=NOT file%?&2D:RETURN
 1130 REM Alter Lasers
 1140 REPEAT file%?(FN_MENU(5)+&F)=laser
%(FN_MENU(4)):UNTIL FALSE
 1150 REM Number of missiles
 1160 CLS
 1170 PRINTTAB(8,9)"Enter how many missi
les"
 1180 PRINTTAB(13,12)"you require."
 1190 file%?&33=FN_INPUT(19,15,3,255,FAL
SE)
 1200 RETURN
 1210 REM Alter combat rating
 1220 file%!&47=rating%(FN_MENU(6)) OR (
file%!&74 AND &FFFF0000)
 1230 RETURN
 1240 REM Alter legal status
 1250 file%?&34=status%(FN_MENU(7))
 1260 RETURN
 1270 REM Set Galaxy
 1280 CLS
 1290 RESTORE 1340
 1300 PRINTTAB(10,8)"Enter Galaxy Number
."
 1310 file%?&F=FN_INPUT(19,11,1,8,FALSE)
-1
 1320 FOR A%=1 TO file%?&F+1:READ file%!
1,file%!5:NEXT A%
 1330 RETURN
 1340 DATA &5A4AAD14,&B7530248
 1350 DATA &B4945F60,&6FA60490
 1360 DATA &69296F5A,&DE4D0821
 1370 DATA &D2526763,&BD9A1042
 1380 DATA &A5A45D69,&7B352084
 1390 DATA &4B496663,&F66A4009
 1400 DATA &96925F6A,&EDD48012
 1410 DATA &2D25605E,&DBA90124
 1420 REM Set up Cargo
 1430 CLS
 1440 PRINTTAB(22)"Quantity Quantity"
 1450 PRINT" No.   Product   Unit as Car
go for Sale"
 1460 FOR A%=1 TO 17
 1470 PRINTTAB(1);A%;".";TAB(5);cargo$(A
%);TAB(18);FN_UNIT;TAB(24);(file%?(A%+&1
6));TAB(33);(file%?(A%+&34))
 1480 NEXT
 1490 VDU &86,&9D,&81:PRINT"   ESCAPE to
 return to main menu"
 1500 REPEAT
 1510 PRINTTAB(1,20)"Enter number of pro
duct to alter"
 1520 number%=FN_INPUT(34,20,2,17,FALSE)
 1530 PRINTTAB(1,20)"Enter quantity of "
;cargo$(number%);SPC(13);TAB(1,21)"in ca
rgo bay";SPC(19)
 1540 PRINTTAB(23,number%+1);CHR$&88;TAB
(28,number%+1)CHR$&89
 1550 file%?(number%+&16)=FN_INPUT(14,21
,3,255,FALSE)
 1560 PRINTTAB(23,number%+1);" ";(file%?
(number%+&16));"  "
 1570 IF number%=17 THEN 1620
 1580 PRINTTAB(32,number%+1);CHR$&88;TAB
(36,number%+1)CHR$&89
 1590 PRINTTAB(1,21)"for sale at planet"
 1600 file%?(number%+&34)=FN_INPUT(20,21
,3,255,FALSE)
 1610 PRINTTAB(32,number%+1);" ";(file%?
(number%+&34));"  "
 1620 PRINTTAB(0,20);SPC(119);
 1630 UNTIL 0
 1640 DEF FN_UNIT
 1650 IF A%<14 THEN ="t" ELSE IF A%<16 T
HEN ="kg" ELSE IF A%=16 THEN ="g" ELSE =
"t"
 1660 REM Set Up Mission
 1670 ?file%=mission%(FN_MENU(8))
 1680 IF ?file%=1 THEN file%!1=&B4942190
:file%!5=&6FA60490:file%?&F=1
 1690 IF ?file%=&A THEN file%!1=&692954D
7:file%!5=&DE4D0821:file%?&F=2
 1700 lock%=(?file%=1 OR ?file%=&A)
 1710 RETURN
 1720 REM Re-save file, and error contro
l
 1730 IF INKEY(-1) OR ERR<>17 REPORT:PRI
NT" at line ";ERL:GOTO 1800
 1740 IF main_menu%=FALSE THEN 160
 1750 CLS
 1760 main_menu%=FALSE
 1770 PRINTTAB(5,5)"ESCAPE to re-edit co
mmander"
 1780 FOR A%=10 TO 11:PRINTTAB(11,A%)CHR
$&8D;"Save commander.":NEXT A%
 1790 CALL check%:PROC_oscli("SAVE "+FN_
FILENAME+" "+STR$~(file%)+" +100 0 0")
 1800 *FX4
 1810 END
 1820 DEF FN_YES_NO
 1830 PRINT"? (Y/N)";CHR$&88;
 1840 REPEAT get%=GET AND &DF:UNTIL get%
=&59 OR get%=&4E
 1850 VDU get%
 1860 REPEAT get2%=GET AND &DF:UNTIL get
2%=&59 OR get2%=&4E OR get2%=&D
 1870 IF get2%<>&D THEN get%=get2%:VDU &
7F:GOTO 1850
 1880 VDU 8,8,32
 1890 =get%=&59
 1900 DEF FN_FILENAME
 1910 PRINTTAB(4,15)"Please enter filena
me ";
 1920 VDU 23,1,1;0;0;0;
 1930 input$=""
 1940 REPEAT
 1950 REPEAT get%=GET:UNTIL (get%>&1F AN
D get%<&80) OR get%=&D
 1960 IF get%<>&7F THEN 1990
 1970 IF LEN(input$) input$=LEFT$(input$
,LEN(input$)-1):VDU &7F
 1980 GOTO 2000
 1990 IF (LEN(input$)<10+(3*(file_system
%=4))) AND (get%<>&D) THEN input$=input$
+CHR$(get%):VDU get%
 2000 UNTIL get%=&D AND input$<>""
 2010 VDU 23,1;0;0;0;0
 2020 IF file_system%=4 THEN PRINTTAB(9,
19)"Enter drive number ":=":"+STR$(FN_IN
PUT(28,19,1,3,FALSE))+".E."+input$
 2030 =input$
 2040 DEF PROC_oscli($memory%)
 2050 PRINT
 2060 X%=memory% MOD &100
 2070 Y%=memory% DIV &100
 2080 CALL &FFF7
 2090 ENDPROC
 2100 DEF FN_MENU(number%)
 2110 VDU 23,1;0;0;0;0
 2120 CLS
 2130 FOR A%=0 TO 1:PRINTTAB((39-LEN(men
u$(number%,0)))DIV 2,A%)CHR$&8D;menu$(nu
mber%,0):NEXT A%
 2140 FOR A%=1 TO entries%(number%)
 2150 PRINTTAB(3,(A%*2)+1);CHR$129;A%;".
";CHR$134;menu$(number%,A%);
 2160 IF details$(number%,A%)<>"N"  PRIN
TCHR$&82;"(";EVAL(details$(number%,A%));
")"
 2170 NEXT A%
 2180 PRINTTAB(0,21)"Enter which functio
n you require (1-";entries%(number%);")"
 2190 PRINTTAB(3,22)"or ESCAPE to ";
 2200 IF number%=1 PRINT"re-save command
er";:main_menu%=TRUE ELSE PRINT"return t
o main menu";
 2210 REPEAT get%=GET-&30:UNTIL get%>0 A
ND get%<(entries%(number%)+1) AND NOT((g
et%=7) AND (number%=1) AND lock%)
 2220 PRINTTAB(0,(get%*2)+1);CHR$&88
 2230 REPEAT get2%=GET:UNTIL (get2%>&30
AND get2%<(entries%(number%)+&31) AND NO
T((get2%=&37) AND (number%=1) AND lock%)
) OR (get2%=&D)
 2240 IF get2%<>&D THEN PRINTTAB(0,(get%
```





```
*2)+1);" ":get%=get2%-&30:GOTO 2220
 2250 main_menu%=FALSE
 2260 =get%
 2270 REM FN's to display status next to
 menu entry
 2280 DEF FN_STATUS
 2290 Z%=4
 2300 REPEAT Z%=Z%-1:UNTIL file%?&34>=st
atus%(Z%)
 2310 =menu$(7,Z%)
 2320 DEF FN_RATING
 2330 Z%=10
 2340 REPEAT Z%=Z%-1:UNTIL (file%!&47 AN
D &FFFF)>=rating%(Z%)
 2350 =menu$(6,Z%)
 2360 DEF FN_MISSION
 2370 IF ?file%=6 THEN =menu$(8,4)
 2380 Z%=0
 2390 REPEAT Z%=Z%+1:UNTIL ?file%=missio
n%(Z%)
 2400 =menu$(8,Z%)
 2410 DEF FN_ENERGY
 2420 Z%=file%?&2B
 2430 IF Z%>3 THEN Z%=3
 2440 IF Z%=0 THEN ="Not Present" ELSE =
menu$(3,Z%+1)
 2450 DEF FN_LASER
 2460 Z%=0
 2470 REPEAT Z%=Z%+1:UNTIL file%?(A%+&F)
=laser%(Z%)
 2480 =menu$(4,Z%)
 2490 DEF FN_GOT(A%)
 2500 IF A% THEN ="Present" ELSE ="Not P
resent"
 2510 DEF FN_INPUT(X%,Y%,L%,max,point%)
 2520 LOCAL input$
 2530 VDU 23,1,1;0;0;0;
 2540 PRINTTAB(X%,Y%);SPC(L%);TAB(X%,Y%)
;
 2550 input$=""
 2560 REPEAT get%=GET:UNTIL (get%>&2F AN
D get%<&3A) OR (get%=&2E AND point%) OR
(get%=&7F) OR (get%=&D) OR (get%=&15)
 2570 IF get%=&15 THEN 2540
 2580 IF get%<>&7F THEN 2610
 2590 IF input$<>"" input$=LEFT$(input$,
LEN(input$)-1):VDU &7F
 2600 GOTO 2560
 2610 IF LEN(input$) THEN P%=INSTR(input
$,".") ELSE P%=0
 2620 IF get%=&2E AND P% THEN 2560
 2630 IF P% AND (P%<LEN(input$)) AND get
%<>&D THEN 2560
 2640 IF get%<>&D AND LEN(input$)<L% THE
N input$=input$+CHR$(get%):VDU get%
 2650 IF get%<>&D OR input$=""THEN 2560
 2660 IF VAL(input$)<=max VDU 23,1;0;0;0
;0:=VAL(input$)
 2670 PRINT'"  Maximum possible value is
 ";max;
 2680 get%=INKEY(100)
 2690 GOTO 2540
```

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Get it right ✓

```
  10 =    0 0    320 = 935A 3    630 = 4EEA 8    940 =    0 1   1250 = A0BD 9   1560 = 3E96 9   1870 = 87F5 3
  20 =    0 0    330 =  3A6 D    640 = BB6F 7    950 = BFBA B   1260 = 6E17 1   1570 = 22CF 5   1880 = 7A06 D
  30 =    0 0    340 = 50DF 3    650 = 82C4 C    960 = 41C4 2   1270 =    0 1   1580 = 71F2 4   1890 = 3EE1 5
  40 =    0 0    350 =    0 3    660 = 2A17 F    970 = 226C 7   1280 = 7A16 9   1590 = 2C9B D   1900 = 4DE0 A
  50 =    0 0    360 = EEC2 2    670 = 78F0 7    980 = 61F4 6   1290 = 62AC 1   1600 =  74F 2   1910 = A674 B
  60 =    0 0    370 = 5250 3    680 = 2A96 5    990 = F880 2   1300 = B8F0 0   1610 = 5A31 7   1920 =  2C6 E   2180 = 5D16 A   2440 = 3707 1
  70 =    0 0    380 = D1B1 6    690 = 74FB 5   1000 = 426B B   1310 = 4A52 C   1620 = 297D 6   1930 = 21C3 7   2190 =  209 B   2450 = 2AEB 6
  80 =    0 0    390 = 9B76 B    700 = 54D4 C   1010 = 6E17 0   1320 = 2195 A   1630 = 91B6 E   1940 = BFBA 4   2200 = 7619 A   2460 = 353C 5
  90 =    0 0    400 = E480 0    710 =  EB9 C   1020 = E175 0   1330 = 6E17 E   1640 = FBC2 2   1950 =   48 D   2210 = FC31 8   2470 = B893 5
 100 = 1092 2    410 = 807E 9    720 = 8558 E   1030 = 91A4 F   1340 = C1E6 C   1650 = D5BB 4   1960 = FA90 8   2220 =  A7D 7   2480 = CCE8 7
 110 = CDFD 0    420 = A71D 8    730 = E8A9 3   1040 = 6E17 8   1350 = C95C 3   1660 =    0 4   1970 = 9FAD 9   2230 = 4951 0   2490 = 3F0F C
 120 = CF59 7    430 = 5043 A    740 = D7D3 0   1050 =    0 8   1360 = 1010 8   1670 = 81C5 A   1980 = 5504 8   2240 = E15F C   2500 =  DC1 B
 130 = B128 3    440 =  99F B    750 = 4F9A 9   1060 =  C8F 3   1370 = 2C9A 6   1680 = D9A9 C   1990 = BB03 D   2250 = 91D9 9   2510 = 5EE8 B
 140 = DFB4 8    450 = FDCB C    760 = 8B58 0   1070 = 9543 0   1380 = 3578 1   1690 = F2A6 8   2000 = C9A7 B   2260 = E5AA 8   2520 = 9FCB E
 150 = CAD6 A    460 = B1EF A    770 = E24E 7   1080 = 7D4A 9   1390 = 4C03 1   1700 = 7421 1   2010 = 7FAF 9   2270 =    0 8   2530 =  2C6 F
 160 = BFBA 1    470 = 226A 1    780 = ED0F 5   1090 = 3B78 1   1400 = BF7A 9   1710 = 6E17 6   2020 = 96BC 6   2280 = E73F 2   2540 = D515 D
 170 = 6A6F 9    480 = E680 A    790 = D1C3 8   1100 = 5F7F 9   1410 = 800C A   1720 =    0 6   2030 = A3FF 6   2290 = 75B8 8   2550 = 21C3 4
 180 = 226C A    490 = A09C 8    800 = 91DF B   1110 = 1981 D   1420 =    0 A   1730 = C699 8   2040 = C066 D   2300 = 1A63 8   2560 = BA91 0
 190 = 5569 C    500 = B18D 5    810 =  264 9   1120 = E486 8   1430 = 7A16 A   1740 = 2DAB 4   2050 = FF3E B   2310 = 223A E   2570 = 7922 5
 200 = CDBC E    510 = C243 7    820 = 47D1 9   1130 =    0 8   1440 = 75E6 3   1750 = 7A16 4   2060 = 9762 A   2320 = AE7E 6   2580 = 27C9 B
 210 = 3F31 7    520 = ED0F 8    830 = 4B8A 1   1140 = F61F E   1450 = 4E7A F   1760 = 91D9 C   2070 =  CC0 A   2330 = 5F94 A   2590 = CF1C 1
 220 = 7FAF F    530 = 23C9 A    840 = 13D7 D   1150 =    0 E   1460 = F205 4   1770 = 9560 6   2080 = 17A4 F   2340 = E554 0   2600 = 427F B
 230 = ED0F 9    540 = 108D 4    850 =  C77 E   1160 = 7A16 4   1470 = 3883 4   1780 = 437B B   2090 = ED0F E   2350 = 886B 1   2610 = 83FB E
 240 = C12E 2    550 = 25C8 8    860 = ED0F C   1170 = CB95 3   1480 = 2C83 B   1790 = F8D4 C   2100 = E2CB 7   2360 = 2B1F 0   2620 = D4EF C
 250 = 4630 B    560 = 4133 7    870 =    0 C   1180 = F844 3   1490 = 35F3 3   1800 =  129 7   2110 = 7FAF 4   2370 = 87D4 E   2630 = E502 C
 260 = A6EE 6    570 = 92FD 5    880 = 7A16 E   1190 = F6E2 7   1500 = BFBA F   1810 = FD2E F   2120 = 7A16 F   2380 = 353C 6   2640 = 9765 A
 270 = B019 5    580 = F5EA 3    890 = 8D07 C   1200 = 6E17 D   1510 = 1816 6   1820 = C53C 5   2130 = FB88 0   2390 =  60C 5   2650 = 683E 9
 280 = EEC7 F    590 = 20CC A    900 = F844 1   1210 =    0 D   1520 = FA2F 0   1830 = 916F F   2140-= 3EEC 6   2400 = 47C3 1   2660 = 3E48 2
 290 = F61C E    600 =  A74 7    910 =  500 F   1220 = EDA0 9   1530 = C212 5   1840 = B44C B   2150 = C2A9 1   2410 = 8EA4 8   2670 = A6CB 4
 300 =    0 E    610 = 7167 E    920 = D4E6 E   1230 = 6E17 7   1540 = 6D24 5   1850 = 8EB1 C   2160 = 54D7 D   2420 = 9601 6   2680 = B066 B
 310 = 480E C    620 = 16FC 1    930 = 6E17 1   1240 =    0 7   1550 = 4CCA 8   1860 =  171 2   2170 = 7190 E   2430 = 3B1A C   2690 = F432 8
```

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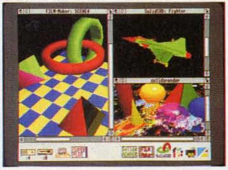
SOLIDTOOLS



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(RISC OS) ***New***

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- RISC USER August 1989.

"In summary, BASIC V is the best version of BASIC produced and RiscBASIC provides the most compatible, fastest compiler for this language. This will be an invaluable addition to every serious BASIC programmer's toolkit. My congratulations to Silicon Vision" - Archive June 1989.

"very useful indeed for development work...produced significantly more efficient code" - Micro User July 1989.

"RiscBASIC wins the race...has the edge overall...more likely to provide the correct results" - BBC Acorn User Nov 1989.

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(RISC OS) ***New***

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(RISC OS) ***New***

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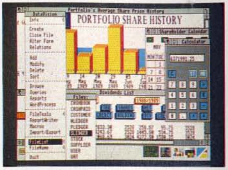

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Bursting out all over

Teri Paul explores the world of free software for the BBC and Archimedes

TO fend off both the letters and telephone calls demanding more space for the BBC Micro, I'll immediately dive into the public domain programs available for the 8 bit range.

There is an awful lot of good – as well as mediocre and bad – software out there, although most of it does seem to be available primarily for 80 track discs. So check before parting with any money.

A lot of the games I come across for the Beeb have the feel of rejected magazine listings, but every now and then you'll find a gem.

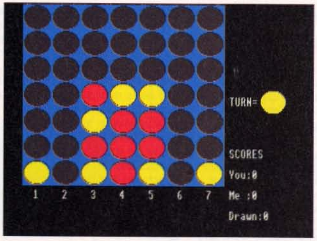
Text adventures abound, and most are worthy of a good dabble. Inca Treasure, which I've just started playing, is OK so far – although it took me a while to discover that what you do with a machete is *hack*.

Fighter Command is not my cup of tea but there is a lot of thought and detail involved here and it should keep simulator enthusiasts busy for hours.

Jonathan Harston – BBC PD – has written his own filing system, HADFS. Needing 16k of sideways ram, it partitions a DFS disc and provides a hierachical filing system on a standard DFS.

It seems a little faster than the normal ADFS too, but please note you can't read ordinary ADFS discs with it. Its main advantage is that you bypass the 31 file limit.

There where some really excellent music demos with keyboard and chord representation on the discs too. The rendering of Bach's D Minor Toccata was just right, although the Cheers theme left a little to be desired. The more programming-oriented might try the small C compiler.



Connect 4 plays a mean game

On the Archi front

My thanks to Joris Röling from the Netherlands who sent me some of his latest programs. You'll often find his work in both the public domain and distributed as shareware programs – which means that if you like it, send him money!

One program in particular I use every day is Menon. Now in version 1.86, it's a diamond icon which sits on the DeskTop background or icon bar and is an absolute godsend to anyone whose hard disc is as packed as mine.

Put simply, Menon allows you to access the programs or files you use frequently via a menu, or in the latest version by pressing Control plus a key of your choice.

In addition f11 will allow instant access to the task manager window, while Shift+f11 closes all the filer windows on your DeskTop. It is simple to set up and configure to your own requirements, and you'll wonder how you lived without it. I also find it an excellent way to keep inexperienced fingers out of my hard disc.

Other extremely useful utilities appeared on the same disc. Aidon intercepts the disc free inquiry and brings up a proper multi-tasking window showing the amount of free and used space with a bar representation of the space used as well. If you wish you can customise it by changing the colour.

Blinker is similar to Minerva's Flasher, but is of particular use to anyone with a monochrome monitor as the caret – the stick which shows you where you are typing next – blinks consistently, increasing its visability.

Another couple of small but useful items are !CheckTemp and Clipboard. The former shows you the size of a window in a template file. Each time you drag a template file to this application you'll be told of the contents and size as well as the largest window

➤

HANGMAN
Letters used
Words guessed
Right letters
Wrong letters
Total bonus
Total score

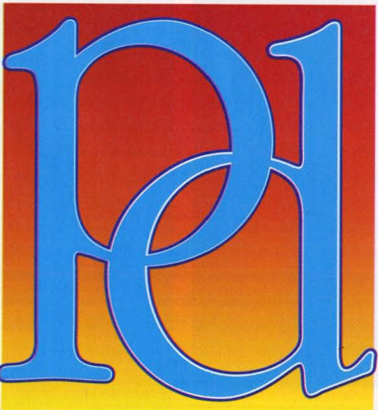
A bit hung up

Virus talk

Glyn Davies from Wrexham, has written a useful little utility called !FileCheck. Waiting for you to double click it then checks to see if an application is the object of your choice. If so it looks for: !Run; !RunImage and !Boot.

It then assesses its own data files and if the file lengths have increased, the files are renamed and the user notified. Although it won't remove any virus, it will tell you its suspicions so that you can investigate further.

As the good old Beeb is virus-proof some of you might feel a little left out. Never mind, you can now experience – or terrify – your friends with an old PC virus. When you boot Virus Simulator the initial start up screen will begin to break up with the letters gracefully falling to the bottom of the screen.



➤

definition and the total data figure.

Clipboard, on the other hand, is a small module which allows you to copy the text contents of writeable icons into a buffer by using a few standard control keys – Control+C to copy, Control+V to paste and so on.

Gameswise, a couple of interesting variations appeared on my desk. Hangman arrived courtesy of Telstar, and gave a picturesque backdrop to a nicely drawn victim.

The way you have to input the letters, though clever, rather defeated itself by being back-to-front and unnecessarily fiddly. It does play a mean game though.

Connect 4 might not be much to look at, but it took me a while to win a game. Invaders is handy at getting rid of your frustrations, but you'll need a copy of MemAlloc to run it – Lander on Applications Disc Two will oblige.

Musically speaking I have been rather more impressed by what has been done on the Beeb – considering its limitations – when compared to the Archimedes offerings.

However, some nice new tracks have appeared as well as a couple of new ways of playing them – !Anyplay by A.E. Hersee only uses 18k as opposed to !S/Tracker's 26k.

Batman, AKA H.T. Wilkins, dropped me a line this month too. A couple of programs worthy of mention are PrinterTX by Nigel Gent and Scrolltxt.

PrinterTX is actually a shareware program which will cost you £5 if you want the latest version. A simple little program, you simply drop any text file on the icon and it will go away and print.

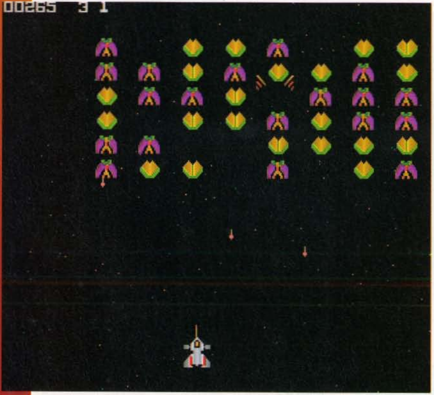
It is written for Epson compatibles and works most successfully with a Star LC10. Our office laser didn't want to know at all, but as the program is being worked on your registration fee could bring you improved compatability.

Scrolltxt is a relocatable module which allows you to control a professional looking scroll text program from Basic. All you need do is write a datafile making sure that it's in UPPER CASE and finish your masterpiece with a control code or an *a*.

Though demos are usually written by programmers wanting to show off their skills – and those of the computer – it's a nice way to impress your friends as well as yourself.

The more adventurous might like to add lower case letters in their data file to create special effects. For instance, *a* will produce an immediate wrap, while *b*, *c* and *e* change the speed. Save your file, use *SCROLLFILE "filename" followed by *SCROLLON and be amazed.

If you really want to impress your friends, or totally stop all conversation over the dinner table then load Travel. You'll then be able not only to discover how far in meters you have moved your mouse/pointer in one day, but also the velocity you reached!



Classic invaders

PD libraries and shareware contacts

For more information send a stamped and self-addressed envelope with your letter to:

Archimedes

Arcaynia PD, PO Box 1927
Sutton Coldfield, B74 3QZ

Arch PD
109 Ferry Road
Hullbridge
Hockley
Essex
SS5 6EL

Armageddon
17 Lee Lotts
Great Wakering
Southend-on-Sea
Essex
SS3 0HA

Cotswold PD
391 Cromer Road
Hellesdon
Norwich
NR6 6LX

Diamond PD
86 Meadowbank
Moor Lane
Holway
Holywell
Clwyd
CH8 7EF

Digital Phenomena
28 Tooting Bec Gardens
Streatham
London
SW16 1RB

Nigel Gent
79 Southwark Close
Stevenage
Hertfordshire
SG1 4PH

David Heath
26 Luxmore Close
Leigham
Plymouth
Devon
PL6 8NX

Hung Computer Systems
82 Roe Lane
Kingsbury
London
NW9 9BD

KJCM Software
5 Blythefield Avenue
Great Barr
Birmingham
B43 6QG

Norwich Computer Services
96a Vauxhall Street
Norwich
NR2 2SD

Telstar Public Domain
1 Hallsworth
40 Alderbrook Close
Rolleston
Staffordshire
DE13 9AH

Westbourne Services
34 Bradley Street
Wotton-under-Edge
Gloucester
GL12 7AR

8 bit BBC Micros

8-Bit Public Domain
7 Ashdale
Thringstone
Leicestershire
LE6 4LW

BBC PD
18 Carlton Close
Blackrod
Bolton
BL6 5DL

BBC-B PD
21 Whitehorse Street
Hereford
HR4 0EP

Joost Dekker
Klembergerweg
7214 BK Epse
Holland

GLM PD
2 Pierrefondes Avenue
Farnborough
Hampshire
GU14 8NF

Harston BBC PD/Shareware
15 Norris Road
Sheffield
S6 4QR

PD Magazine
Computing Department
Ludlow 6th Form College
Mill Street
Ludlow
Shropshire
SY8 1BE

Red Shift Public Domain
Onslow House
Weston Road
Bath
Avon
BA1 2XX

Update

Counting sheep

WE all know what counting sheep is supposed to do but a whole new set of ovines have now been designed to wake children up to the fun of learning maths.

Computer Tutorial Services (0983 294333) have brought out a new version of their Farmer Giles educational program for the Archimedes and BBC A3000 which extends the concepts of the original to provide addition, subtraction, multiplication and division games.

Aimed at attainment target three in the National Curriculum, Farmer Giles II teaches addition when he adds more sheep to his flock. Subtraction comes into play when he takes sheep away to market; multiplication is used when Farmer Giles sells the sheep and division when he decides to slip his flock into eight pens.

As with the original Farmer Giles package, it can be used by single children, a full class or a teachers' section. Scores can be output to screen and/or printer. Price, £17.35 plus VAT.

Joining the dots

EVEN when painstakingly plotted by squinting at minute squares and joining up dots, graphs are universally useful. To make the task easier and the options more flexible, Silica Software Systems (0227 70279) have produced a powerful new mathematical graph plotting package called Fx.

Aimed primarily at secondary schools and especially at A-level students, it allows complex functions to be entered in normal mathematical notation and plotted into many different types of graph using Archimedes and BBC A3000 machines.

Using Fx, students can find the area under curves, superimpose curves, plot the inverse, plot using transformations or constants and produce a series of curves with varying constants.

Functions are shown almost instantaneously on screen allowing roots to be displayed and calculated and areas to be shaded then worked out. A useful resource tool for students to use in their own time, Fx lets them experiment, seeing the effect of changes in functions on their graphs and checking work.

Up to 20 graphs can be plotted on the same axis and there is a zoom feature allowing users to select an area of a graph and enlarge it.

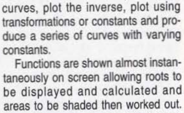
Fx loads on to the icon bar in the DeskTop but enters the main program when the icon is clicked. Pressing Escape returns to the DeskTop so there is no need to quit other applications. Shots of finished graphs can be saved for export into other packages or can be printed out to any Epson compatible printer. Fx costs £19.99 but there is a special educational discount of 25 per cent.

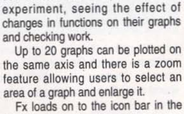
Fun School wins Euro award

WINNER of the Best Home Education Package title in the prestigious European Computer Leisure Awards sponsored by The Micro User, Fun School 2 now accounts for nearly 80 per cent of all educational software sold by computer retailers, according to independent market research commissioned by its developers Europress Software.

In an intensive telephone campaign, more than 150 retailers were questioned on their educational sales. Findings reveal that Fun School 2 outsells all other individual packages and that in the majority of outlets, it achieves more sales than all other products put together. On average, it scoops 79.6 per cent of the retail market.

It achieved its Best Home Education Package title at the recent European Computer Trade Show. Judging of the European Computer Leisure Awards was by a panel of journalists from 31 of Europe's leading computer publications, including **The Micro User.** Nominations for Fun School 2 were three times the amount received by any other competing package.





"We knew Fun School 2 was doing extraordinarily well and we commissioned the research to see just how well", said managing director of Europress Software, Chris Payne. "The findings have even surprised us, especially when you consider that we're up against the likes of the Walt Disney range".

Active market

LONGMAN Logotron (0223 323656) have released a series of Logo activity sheets to give teachers and pupils ideas and resources for tackling the Logo suggestions in the mathematics attainment targets of the National Curriculum.

Written by Marcus Bowman and John Robertson of Craigie College, Ayr, the photocopiable cards include a range of simple tasks and activities for pupils from 10 to 14. There are 16 main sheets and five reference sheets in the pack, plus a teachers' guide to help novice users of Logo.

The guide advises on the place Logo has in the National Curriculum, shows how it can be implemented into the classroom structure and how to integrate it into thematic work. Where relevant, all activities are tied to specific attainment targets. The pack costs £12 plus VAT, postage and packing.

Poodle power

TWELVE teams of pupils from regions throughout the UK have won their way through to the finals of this year's Acorn Schools Challenge with the chance of winning an educational trip to America, an Archimedes A420 or a BBC A3000 with software.

Two hundred schools took part in the competition sponsored by Acorn Computers and organised by Wood Green Animal Shelters to promote responsible pet ownership.

Teams of four pupils aged from 12 to 15 had to answer a number of questions on animal welfare and write a short essay entitled *My Pet on Holiday.* The winning team will go on an educational trip to America as guests of the Humane Society. Other prizes include the Archimedes and A3000 plus a range of software donated by Anglia TV.

Wood Green Animal Shelters are widely recognised as Europe's most progressive and fastest growing animal welfare charity.

Chief executive Graham Fuller said: "Wood Green Animal Shelters are extremely grateful to Acorn Computers for their generous support of this quiz. "The prizes of Acorn computers on offer are reflected in the response the shelters have received from schools".

Teaching computers

WITH so many educational software packages now available, the Institute of Metals Software Sub-committee at the prestigious Rutherford Appleton Laboratory have organised a workshop on the use of microcomputers in science teaching.

It aims to provide practical help for teachers by introducing and evaluating current BBC Micro, Apple Mac and PC software available for teaching Physics, Chemistry and Materials Science.

Delegates will be encouraged to demonstrate their own software and the organisers are offering to refund the registration fee to the person producing "the best previously unpublished program or coded idea at an early stage of development".

The educational level is sixth form and early years of tertiary whether in a college of further education, polytechnic or university. From June 7 to 9, the workshop takes place at Oxford University's Computer Teaching Centre.

"It will be useful for science teachers and area science advisors, partic-

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ularly those looking for ideas on the teaching of the National Curriculum", said Kate Crennell of Rutherford Appleton. "The emphasis will be on participants getting hands-on experience of packages and most of the workshop will take place in the microcomputer teaching laboratory. The tutors are active software authors".

The workshop costs £125 including half board accommodation and lunches. Bursaries of £20 have been offered by the British Crystallographic Association to the first 25 delegates to register.

For further details and registration contact Kate Crennell, IOM Workshop, Rutherford Appleton Laboratory, Chilton, Didcot, Oxon, OX11 OQX. Tel: 0235 446397.

Better Business

A CLIFFHANGING final resulted in two teams being declared joint winners in the third national final of The Young Business People of the Year competition sponsored by catalogue store chain Argos.

Sharing first and second prizes – a total of 8,000 – were the four-girl team from Dominican College, Northern Ireland and the 1990 winners, Farnham College, Surrey.

Dominican College were a close second to Farnham in the playthrough of RBRC Software's business simulation Beat the Boss which accounted for 60 per cent of the overall points. They won the verbal presentation section by a sufficient margin to close the gap.

More than 160 schools took part in this year's competition resulting in five teams for the finals in the Great Hall of the Institute of Chartered Accountants.

The competition aims to give students an insight into the business world and to promote computer-assisted learning.

New Era programs

WHEN it comes to writing software, end users start with the advantage of knowing what they want. Three Derbyshire teachers are now putting that principle into practice and have formed themselves into New Era Software (0283 213766).

They are concentrating on educational packages for the BBC A3000 which are easy to understand and use, giving teachers a good return in terms of classroom work for the efforts they put into computer-based projects.

"As teachers, we are fed up to the back teeth with some of the programs which are coming on line", said spokesman for New Era, Les Roberts. "Firstly it can take a lot of time ploughing through manuals to familiarise yourself with the paint program or whatever it is. You then spend more time generating an exercise.

"I work in special needs education and I can spend up to eight hours producing an exercise which my pupils then run in ten minutes. We are concentrating on programs with manuals which can be easily read in a few minutes. By following simple routines, teachers will quickly be able to generate quality programmes which can last for 20 minutes. Our programs are produced by teachers with teachers in mind".

Already available from New Era is Supermarket, a lifelike simulation of a supermarket checkout which produces itemised till receipts. Available in English, German, Spanish and French, it allows pupils to enter details of purchases, prices and the information they want displayed on the receipt. It is an exercise of benefit to Maths, English and Food Technology pupils. Price £10.

As *The Micro User* went to press, New Era were nearing completion of their most ambitious progam to date – NC Planner – and were negotiating its distribution with a leading educational software company. It is designed to help harrassed teachers translate their topics into National Curriculum attainment targets and combines a database with a mark reader.

Teachers load in the attainment targets then enter the specific topic, introducing a number of key words. The program correlates information on which pupil has completed which topics and how successful they were. The mark reader is a scanner which is used with pre-printed mark sheets. When drawn across the page, it automatically picks up the marks and loads them into the database.

New Era are also working on Wordbank – a package with seven sections which present a whole series of exercises concerning words.

Maths teachers are poles apart

THREE Archimedes computers are to be used to set up a desktop publishing system for the Polish Mathematics Teachers Association in Warsaw. They have been presented to a delegation of Polish mathematics teachers visiting this country as part of the Joint European Commission's Tempus programme.

The 11 Polish visitors have been in the UK for six weeks at West London Institute of Higher Education and the University of Warwick. The presentation was made on behalf of Tempus by principal of the West London Institute, Professor John Kane.

As well as helping with the DTP project, the Archimedes machines will help the Poles keep in touch with new UK software developments. A problem with the Polish alphabet was solved by calling in Electronic Font Foundry. The group's leader Dr.

Maciek Brynski said they would be analysing what they had seen in the UK so they could take the information home with them – use it and possibly even improve on it.

The group have been working in various English schools and one teacher from near the Soviet border said he had been astonished by the different teaching styles, classroom organisation, ability of the children and even the mathematical knowhow among teachers themselves.

Program helps problem school

FOLLOWING Education Secretary Kenneth Clarke's urgent call for educational improvements at Culloden School, Tower Hamlets, Europress Publications have offered parents free copies of their home computer program Spell! to help improve their childrens' skills.

The offer followed highly critical reports on poor reading and spelling at the school which was praised in a six part BBC2 documentary.

Concepts which led to the development of Spell! have also been greeted with approval by Minister for Education, Tim Eggar.

"The Secretary of State is concerned at the perceived decline in the standard of spelling amongst young people and is keen that everyone in the world of education should take serious steps to improve those standards", he said.

"Good spelling is essential in all branches of knowledge and while it is not possible for Ministers to endorse individual commercial products of this kind, the government does welcome such initiatives as a way of raising standards in our schools".

Culloden Primary School uses the controversial "real books" method to teach reading in place of more traditional lessons. Independent inspectors have now found serious shortcomings in pupils' reading and spelling abilities. As a result, Kenneth Clarke has called for immediate action to raise standards at the school.

"We developed this program following Kenneth Clarke's recent stance on bad spelling. We realised that parents now have a crucial part to play in helping their children spell correctly", said a Europress spokesman. "With the problems at Culloden, we have offered free copies of the program to any parents there who want them".

A copy of Spell! has also gone to top educational psychologist Martin Turner, the man whose tests first highlighted the problems at Culloden.

Spell! was launched because of new Government plans to deduct examination marks for bad spelling. With a bank of more than 5,000 words combined into five different tests and games, it works on six of the most popular home computers.

ideA

The *ideA* range of hard disc upgrades is being welcomed as the best way forward for Archimedes and A3000 users. "IDE is the small-computer drive standard for the future," says RISC User. "ST506 is on the way out; SCSI has only a limited future in the small drive market."

PERFORMANCE

IDE is the only true 16-bit hard disc system currently available for Archimedes computers. All data transfers are 16-bit all the way from the disc, through the interface, to the computer (except that the A3000 internal interface has an 8-bit link to the computer).

FLEXIBILITY

An *ideA* system can turn your A3000 into a 20, 40 or 60 Mb workstation with no external attachments, using hard discs which sleep quietly during periods of inactivity.

An *ideA* system can cater for two hard discs in the same internal or external housing, allowing you to build up your capacity in easy stages without wasting money.

Then there's the *ideA* 'hard card' option – a 2½-inch hard disc on a standard podule.

VALUE

We think *ideA* upgrades offer the best value for your money, and we aim to keep it that way. Advanced IDE disc technology means simpler, cheaper, more reliable interfaces. Manufacturers' prices for hard discs fall gradually, and we pass these savings on to you as soon as we can.

Our upgrade prices include everything you need.

RELIABILITY

The first *ideA* customers have been using the system successfully for over six months now. The A3000 internal hard disc is exceptionally reliable – not a single one has had to be returned to us.

The latest IDE discs are ruggedly designed with lap-top and portable computers in mind. You'll wait a long time to see a defect! A skilled service team is ready to back up our guarantee should the need ever arise.

COMPATIBILITY

The Micro User reported "no difficulty in running all fully RISC OS applications". Our IDE filing system is no different from ADFS in use, though it has a few extra features such as the facility to write-protect a hard disc. DOS partitions can be created for the PC Emulator.

CONTINUED SUPPORT

The next couple of years will see the introduction of many new IDE products, including tape streamers and removable discs. You may rest assured that our software and hardware will keep pace with these developments. Updates for existing users, if they ever become necessary, will be simple and cheap.

"A beautiful solution," said BBC Acorn User. Study our price list elsewhere in this magazine, and let us solve your storage problems too.

Be in at the beginning!

Other products too good to miss!

See our other advert for prices

TWO (Task and Window Organiser)

Do you wish you could start applications, display directories, and open files all in one go? With TWO you can.

Do you wish your pupils were able to start work without understanding the Desktop? With TWO they will be.

Do you wish there was an easy way to tidy up your screen and find that buried window? With TWO there is.

TWO is far more than a 'sticky backdrop'. Its easy-to-use features make the Desktop a friendlier environment and will really save you time.

DrawBender

DrawBender distorts Draw files to follow a shape of your choice. A useful addition or cheap alternative to Poster, supplied with these three decorative fonts.

DrawBender is simple to use, without any complex menu structures. The example above uses DrawBender with **FontFX** – the two make ideal companions.

AnDi Oddule

Baildon Electronics Oddules open the way to cheap, flexible and almost unlimited external expansion via the I²C bus already supported by RISC OS. Baildon are producing a range of Oddules which may be daisy-chained.

Ready now is the ***AnDi*** Oddule. It has eight digital I/O channels with high current open collector drivers, four A/D inputs, and one D/A output. AnDi is capable of emulating user and joystick ports, allowing ADVAL operation from BASIC, and the use of Concept Keyboards and analogue or digital joysticks.

Cross-32 Meta-Assembler

This professional table-based cross-assembler works with over 50 target processors (including ARM2 and 3), and has been used for some time on PCs. A RISC OS Desktop version by Baildon Electronics is now available. Cross-32 is user-friendly and supports conditional assembly and macros. Output is in absolute binary, or Intel or Motorola Hex formats (ideal for eprom programmers and emulators).

You can modify the tables supplied or add new ones to cater for new processors and opcodes.

Ian Copestake Software

TMU6, 10 Frost drive, WIRRAL, Merseyside, England, L61 4XL
Tel / Fax 051-648 6287

Dabhand Computing Ltd.

TERMS: UK residents add 17.5% VAT to all prices, except books. Delivery FREE on all postal items in the UK. Export, no VAT, carriage at cost. (quotations available). Europe maximum £5 software, £40 hardware. Access/Visa cards accepted by post/phone/in person. We are authorised Acorn dealers. Official orders accepted from public sector/education/PLCs, otherwise cash with order. Tender invitations welcome. Callers welcome. We are 800 yds north of J17, M62. Fax: 061-766 8425. Price subject to change without notification. Goods offered subject to being unsold.

Dabhand Computing Ltd, 5 Victoria Lane, Whitefield, Manchester M25 6AL. This advert was produced using Impression from Computer Concepts.

Archimedes Computers

A 3000 2Mb Ram	**£599.00**
A 3000 LC 2Mb Ram *	**£699.00**
A 410/1	**£1099.00**
A 420/1 LC **	**£1299.00**
A 440/1	**£1699.00**
A 540	**£2995.00**

We can match or improve on prices advertised or quoted in or from this magazine please phone for the best deals.

We operate the Acorn Schools, Academics & Finance schemes.

* Pack includes PC Emulator, 1st Word Plus, Genesis. ** + Acorn DTP.

Oak SCSI Devices

Worra Winnie	
20 Mb Internal Hard Disc	£299
45 Mb Internal Hard Disc	£399
80 Mb Internal Hard Disc	£599
100 Mb Internal Hard Disc	£795
200 Mb Internal Hard Disc	£1195
20 Mb External Hard Disc	£349
45 Mb External Hard Disc	£449
80 Mb External Hard Disc	£649
100 Mb External Hard Disc	£845
200 Mb External Hard Disc	£1245
High Speed Range	
40 Mb Internal Hard Disc	£495
80 Mb Internal Hard Disc	£675
100 Mb Internal Hard Disc	£995
200 Mb Internal Hard Disc	£1545
45 Mb External Hard Disc	£685
80 Mb External Hard Disc	£865
100 Mb External Hard Disc	£1185
200 Mb External Hard Disc	£1735
60 Mb Tape Streamer	£795

Archimedes A400

5.25" Ext. floppy disc interface	£30
A 540 4Mb Ram Upgrade	£449
Additional 3.5" Floppy Disc	£119
ARM 3 Upgrade (30 MHZ)	£449
ArVis S-VHS Video Cont. Board	£295
ArVis S-VHS Encoder Board	£145
ArVis Video Graphics Board	£877
Atomwide 8 Mb Memory Upgrade	£850
Chroma 345 Overlay Board	£389
Dongle Dangle (Impression/Oak)	£6
Econet Module	£46
Ethernet Expansion Card	£249
Floating Point Expansion Card	£449
Hawk V9 Video Digitiser	£339
I/O Expansion Card	£79
Keyboard Extender	£8
Midi Upgrade to I/O Exp. Card	£27
Midi Expansion Card	£65
Midi Upgrade Rom	£14
Mouse (New Style)	£40
Scanlight Junior Scanner A6 (CC)	£179
Scanlight Senior Scanner A4 (CC)	£389
Sheet Feeder for above A4 (CC)	£95
SCSI Expansion Card (Acorn)	£229
TCP/IP Ethernet	£199
VIDC Enhancer	£29

Dabhand 410/1 to 420/1

Acorn A410/1 upgraded to A420/1 specification using only the highest quality Samsung Ram and a 20 Mb Seagate ST-125-1 28ms drive or Acorn drive formatted and tested for guaranteed trouble free use.

A410/2 20 Mb	**£1099**
Colour System	**£1289**
Eizo 9060 SZ System	**£1542**

Dabhand 410/1 to 440/1

Acorn A410/1 upgraded to A440/1 specification using a Branded 40 Mb 28ms drive formatted and tested as above.

A440/1 specification	**£1299**
Colour System	**£1488**
Eizo 9060 SZ System	**£1742**

Dabhand ST506 Hard Disc Drives

Archimedes A410 Internal Hard Disc Drives for use with 'on-board' ST506 winchester controller. Comes complete with mounting chassis, screws, connecting cables and easy to follow fitting instructions.

20 Mb 28ms	**£149**
40 Mb 28ms	**£265**

A3000 SCSI Devices

Please refer to Oak External SCSI prices in the opposite column as prices for A3000 external units are the same.

A3000 Ram Upgrade

Atomwide Ram Upgrades

1 Mb Ram Upgrade	**£79**
4Mb upgrade to above board	£170
4 Mb Ram Upgrade	**£215**

A3000 Upgrades

5.25" External floppy disc cable	£15
5.25" External f/disc buffer (Pres)	£46
5.25" External f/disc buffer (Beebug)	£39
Dust cover (Keyboard + Monitor)	£12
User & Analogue Podule	£46
Monitor Stand (Acorn)	£29
Monitor Stand (Pres)	£24
Mouse Extender (No more fiddling)	£8
Serial Upgrade	£19
Serial Link Kit (BBC-Arc)	£14
User & Midi Podule	£46
VIDC Enhancer	£29

A400 Series Ram Upgrades

Fast Samsung Ram complete with step by step fitting instructions.

1 Mb Ram	**£50**
2 Mb Ram	**£95**
3 Mb Ram	**£140**

Standard Monitors

Acorn Colour	**£199**
Microvitec Cub 3000	**£199**
Philips CM8833 II	**£199**
Philips Mono (Green)	**£85**

All monitors come with free lead. State type of computer when ordering.

Multiscan Monitors

EIZO 9060SZ Flexiscan	**£449**
EIZO 9070SZ Flexiscan ^	**£675**
Taxan 770+ LR Multivision	**£425**
Taxan 795 Multivision ^ **	**£495**
Taxan Viking II Mode 23	**£799**

^ comes with free VIDC enhancer.

** monitor has 0.26 dot pitch and Sony Trinitron tube.

Master 128

Master 128	**£369**

Floppy Disc Drives

5.25" Single 40/80 no psu	£95
5.25" Single 40/80 with psu	£109
5.25" Dual 40/80 no psu	£185
5.25" Dual 40/80 with psu	£199
3.5" Single with psu	£85
3.5" + 5.25" 40/80 no psu	£185
3.5" + 5.25" 40/80 with psu	£209

Printers

Citizen 120D+ (Serial add £20)	£129
Citizen Swift 9	£179
Star LC10	£139
STAR LC200 COLOUR (9 pin)	£199
CANON Bubblejet BJ-10e	£289
Canon Bubblejet BJ-130e	£449
Sheetfeeder for BJ-10e	£59
Citizen Swift 24	£249
Colour Kit for above (also Swift 9)	£39
STAR LC24 - 200	£239
STAR LC24 - 200 COLOUR	£289
Sheetfeeder for LC24 - 200	£69
Integrex Colourjet 132	£519
HP Paintjet	£795
LASER DIRECT (Qume)	£899
LASER DIRECT (LPB8 Hi Res.)	£1349

Midnight Graphics Products

Midnight Tracer

!Paint to !Draw conversion, turn your sprite files into fully editable object orientated draw files which can be scaled, rotated and manipulated without any loss of detail.

Ideal for users of all Desktop Publishing and Scanning packages. Accepts any sprite file and offers many image processing facilities. Translation can be colour or monochrome, includes a unique automatic tracing feature, variable trace options and curve fitting facilities.

The manual includes a user friendly tutorial with hints and tips on how to obtain the best results from your sprite files.

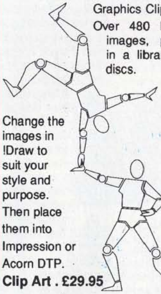
!Tracer is an ARM coded Risc OS multitasking application and will easily run on a 1Mb machine.

Midnight Tracer £52.13

Clip Art - Draw Files

Give your DTP documents the right balance with Midnight Graphics Clip Art.

Over 480 Draw file images, presented in a library of five discs.



Change the images in !Draw to suit your style and purpose. Then place them into Impression or Acorn DTP.

Clip Art . £29.95

Books (No Vat)

C: A Dabhand Guide	£14.95
Archimedes Assembly Language	£14.95
Archimedes Operating System	£14.95
The above books have accompanying discs add £5 for 5.25", £7 for 3.5"	
A3000 Technical Guide	£29.95
A540 Technical Guide	£65.00
Acorn DTP Advanced U.G.	£14.95
Archimedes First Steps	£9.95

BASIC V: A Dabhand Guide	£9.95
BBC Basic Guide (Acorn)	£19.95
DTP Seeds (4Mation)	£8.45
128 Ref. Man.Pts 1&2	(ea.) £14.95
New Advanced User Guide	£19.95
RISCOS PRM's	£79.00
Additional Arc Software Manuals (Acornsoft)	
First Word Plus, DTP, Assembler .	(ea.) £10
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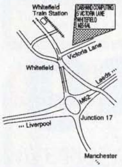

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Mixed bag of fun

Does Fun School 3 live up to the reputation of it's predecessor? Shelley Birchenough investigates

Product: Fun School 3
Price: £16.99 (5.25in disc), £12.99 (BBC tape).(3.5 in disc available on application). There is no Electron version.
Supplier: Database Educational Software, Europa House, Adlington Park, Macclesfield SK10 4NP.
Tel: 0625 878888
Requirements: BBC B, B+, Master and Compact

IN view of the high standard of Fun School 2, Database were faced with a nigh on impossible task to *follow that*, but it seems that – with the possible exception of the Over 7's disc – they have succeded.

Programs for the **Under Fives** are bright and colourful, managing to disguise learning as enjoyment. A wide range of curriculum areas have been covered, with careful attention paid to preparation for the National Curriculum.

Although the programs are easier to use than those in Fun School 2, more clarification is needed in the instruction manual. The f9 key allows parent or teacher to change the difficulty level – but discovering this is left to your initiative. There's no automatic level adjustment as in the earlier set either.

The first program – **Matching** – is a simple game with higher levels providing more pairs to be matched. Both colours and shapes are used, but at lower levels not all the windows are opened, which results in a cluttered screen.

The famous Fun School teddy has to watch a woodpecker climb a tree rather than do it himself. Key controls are kept to a minimum and the program is simple to explain. Usefully, it can be used by children without constant adult supervision.

Actions'introduces young children to verbs, and the graphics for this section are particularly entertaining. In higher levels the *ing* ending is added. Unfortunately, the verbs include irregular spellings such as *sitting* and *juggling*, which are too confusing for children at this stage.

The choice of verbs could also have been more carefully linked to those found in the more commonly used reading schemes. There are times when teddy is performing two different, recognised actions but the computer will only accept one as correct. Children may well need help with the reading aspect of this program.

Gallery suffers from the same hiccups with the choice of words, although as words are being matched to pictures it is not so much of a problem. The words used are those found elsewhere in this group. A simple program, but the method of moving the titles under the pictures is rather clumsy.

Counting is the best of the set. After being shown a teddy sitting on a step with a pot of honey either three, six or nine steps above him, the scene changes to a picnic containing different numbers of objects which must be counted.

Less able readers are provided with a picture clue as to the item to count – combining matching and adding skills in one exercise.

Successful counting results in the teddy somersaulting up a step then returning to the picnic for further work. When he finally reaches the honey he settles in for a good munch.

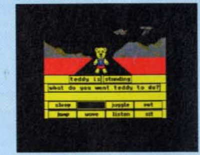
My only complaint is that teddy starts on step one rather than at the bottom, which would be more mathematically correct. The graphics are very entertaining.

Letters is another useful program, especially when children are required to match lower and upper case letters with each other. The lower levels are most useful with children having their initial encounters with the alphabet.

Finally there is another version of the *Make a picture* idea. For me, the educational value would have been more obvious had the names of the colours been introduced.

It is noticable that more reference is needed to the manual than in Fun School 2, which could reduce its popularity with harassed teachers.

The recommended age ranges have also altered, which leaves teachers of year three children in doubt as to which disc is better to use, as the content of the 5 to 7 programs is more suitable for children of this age.



```
teddy is standing
what do you want teddy to do?
sleep            juggle   eat
jump     wave    listen   sit
```

Under 5's Actions

The second in the set is a mixed bag. It seems to require more of the children than Fun School 2, especially at higher levels. **Journey** is a good introduction to following a map, but even at its simplest level I feel that only Key Stage Two children would be able to cope.

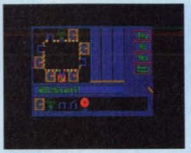
While in essence it seems little more than a development of a maze, it actually requires many complex skills, especially when parts of the map are off screen.

The same problem is evident in **Collect**, as the children are expected to handle quite high numbers for the skills involved. Again I feel that only the most able, or older, children would be able to cope with the thought processes required to arrange a set of numbers into a correct sum, especially when not all the numbers have to be used.

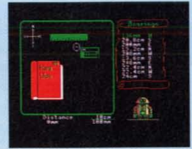
Toyshop is a very basic idea where children select objects of a certain value. An expansion to include the giving of change would have been useful, as children found it hard to understand why they could not buy things costing less than the amount they had to spend. The amounts requiring adding increased in difficulty too sharply considering the intended ability of the child.

The introduction of software which deals with the subject of electrical conduction is innovative but rather too abstract for children initially discovering circuits. A larger group of children would achieve more by practical experience than by using this.

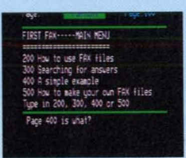
I feel that they would not relate diagrams on a screen to the concepts being taught. It is easy to short cut by



5 to 7's Electricity

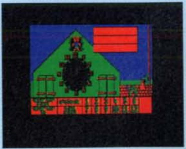


Over 7's Treasure Search

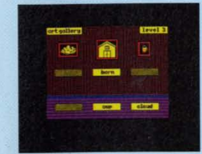


```
FIRST FAX-----MAIN MENU
=======================
200 How to use FAX files
300 Searching for answers
400 A simple example
500 How to make your own FAX files
Type in 200, 300, 400 or 500

Page 400 is what?
```

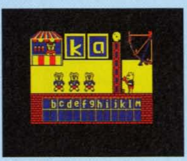
5 to 7's FunText



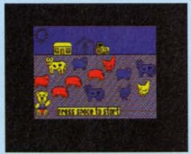
5 to 7's Time



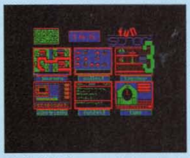
Under 5's Gallery



Under 5's Letters



Under 5's Painting



5 to 7's Main Menu

changing all components of the circuit to the same conductive material, and many children who seek a correct answer would soon exploit this.

Funtext is an interesting introduction to databases, and by using a format similar to Teletext and Ceefax, many children were instantly confident with the program. There were, however, a few problems with the running of this program, which I am sure Database will cure now they are aware of them.

The race against the clock facility made an exciting diversion, but gave unrealistic amounts of time at high level. Most use of Funtext will be made by confident teachers drawing up their own files which is very easy.

Time is drawn out of the mundane category by the excellent graphics, which surprise you on completion. My childrens' one query was *Why is it a teddy and not a frog in the clock?* Also, on the first level, which only deals with *o'clock*, the screen is confused by the inclusion of *half past*, *quarter to* and *quarter past*. Most children in the recommended age group would only be able to cope with help.

I feel that the categorising by age is out of synchronisation, as on the whole this disc is most suited to a six to nine age range.

I had looked forward especially to the **Over 7s** disc and was sorely disappointed. The presentation seemed out of character with the rest of the discs and a constantly flickering cursor was very hard on the eyes.

Word Search is the sort of program you use at the end of term and it is hard to justify its educational value. Only poor readers would benefit from its use and the vocabulary was unsuitable for such children.

It must be remembered that the majority of teachers still lack the confidence to change files and prefer to use those supplied.

Robot Draw again struck me as having little use in the classroom but would find its place in the home where there isn't the access to Logo and a Turtle. The instructions need careful reading and could be daunting if you're not confident with your micro.

Of the six programs, **Planetary Maths** has the most potential for classroom use. Unfortunately, the difficulty level increases erratically and jumps in huge amounts.

The ability to add three digit numbers which requires *carrying* in a brief space of time is asking a lot, and to expect children to perform long multiplication and long division in their heads is demanding the impossible. There were a few quirks with the program but these should have been corrected by the time you read this.

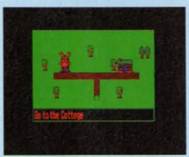
Treasure Search asks children to enter a direction and distance in accordance with a list of instructions. The tasks are rather simple, as the computer automatically converts entries to the correct unit each time. It would have been far more useful if the children were responsible for changing mm to cm or m to km.

At higher levels compass directions, which are always referred to as bearings, change to actual bearings. The maps lack ingenuity and the robots' antics upon finding the treasure are dull to say the least – especially when compared to the graphics on the earlier discs.

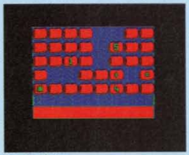
Database lives up to its name. It is precisely that. Compared to those already in use in schools such as Grass, this one is complicated and difficult to use. I feel that children would find it difficult to build up a database of their own, so be prepared to put some time in here yourself.

The final program in the set is **Sentences** where children are asked to examine text and correct errors. Some of the sentences are correct to begin with while others demand a great deal of change.

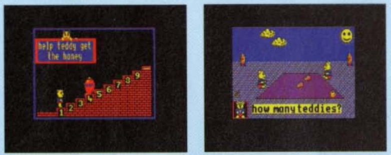
Designed to encourage children to check their own work carefully and improve their grammar it's a useful program for day to day classroom use and reinforcement at home.



5 to 7's Journey



5 to 7's Collect

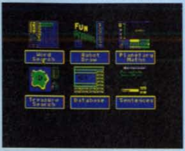


The two screens from the Under 5's Counting

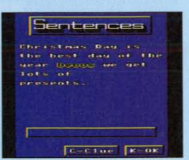
The Archimedes/A3000 version of Fun School 3 will be available shortly. The content of each program is the same as described here but with better graphics and sound.

Summing up

I feel that Key Stage Two teachers may be disappointed by the Over 7s disc, while those teaching Key Stage One will find the 5 to 7s an adequate follow up. Anyone using the Under 5s will be delighted – it's a shame that all three discs are not of the same standard.



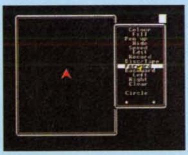
Over 7's Main Menu



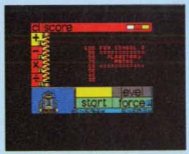
Sentences

Christmas Day is the best day of the year [illegible] we get lots of presents.

Over 7's Sentences



Over 7's Robot Draw



Over 7's Planetary Maths

Meet the Prof

Product: Prof Looks at Words
Price: £15.32 inc VAT.
Supplier: Prisma Software, P.O. Box 211,
Chester CH1 3NJ
Tel: 0244 326244
Requirements: BBC B, B+ or Master

The second of 12 reading aids from Prisma – Marshal Anderson investigates the system's progress

PROF Looks at Words is the second in what promises to be a 12 package reading scheme from Prisma Software. After Prof Plays a New Game, I was looking forward to seeing how the system would progress. The games are identical to the first except for their content.

The first option is to decide which book from the first pack you want to link the game with. This dictates the number and difficulty of the words used, so obviously you will need the first pack to hand.

Then you choose the aspect of letter groups to practice. There are beginnings, vowels, endings, double letters and vowel combinations. These are then sub-divided into three steps of increasing difficulty.

It's important to sort out the terms here, the increasing difficulty is in the amount of help built into the game, not in the content.

A 3x3 grid appears with words in it. To the left is a ladder and further left again are three more squares. For example, Let's Look at Endings starting at step one. You look for words ending in s. So you take the little man into the box with an s in it, press the spacebar to choose it, then find a word ending in that letter.

If you get it right there's a ping and the little man jumps up and down and your letter choice is cleared. If you're wrong you hear a buzz and the letter choice is cleared.

This means that you must reselect the letter you are looking for – a bit tedious at the start when there is only one letter to choose from.

The idea of all this to-ing and fro-ing is reinforcement. The child is constantly having to identify the letter individually and then as part of a word.

Once the child completes a whole screen without errors he or she is presented with three letters to choose from.

Here the thinking process is more complex. Instead of looking at the letter and then finding words ending in it, the child really needs to look at the endings and see if those letters appear in the choices.

Some words appear with missing last letters, so a further level of understanding is required. I have to say this seems quite a conceptual leap in the space of two games.

Having cleared my w and m words I was left with lot, like, word, button and book and s words still to find. I needed to turn them all into plurals. This really seems a bridge too far in terms of progression – in the next game I was asked to turn please into pleased.

Once a step has been finished the child sees a short animation sequence and returns to the menu. The Endings option has a little car and a number one next to it. It's not clear what this means and it is not mentioned in the documentation.

On finishing step two I got a car and a star next to the endings option. Why? Your guess is as good as mine.

I must say I was disappointed with this package, though Prof Plays a New Game was a pretty tough act to follow.

The theory is the children will have become familiar with the nuts and bolts of the games in the first package and are therefore free to concentrate on the content. But I can't help feeling this is just a glib excuse for not producing something more imaginative.

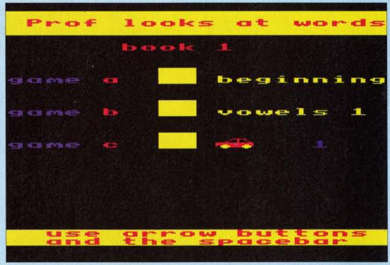
To get through the first package a child will have played this game maybe 20 or 30 times, and to be asked to go through the same process a minimum of another 15 times seems counter-productive.

There didn't need to be a lot of change – make the ladder a rope, change the squares to circles, give us a duck instead of a little man, and the process could have been preserved.

The content and activities are fine, given the reservations about speed of progression, and they will help a child develop. The claim in the documentation that this package can be used independently of Part One is misleading. The idea is that children are working with an established sight vocabulary of 63 specific words.

Those words are not listed here, and the only way your child will have come across that specific list is to have used the first package.

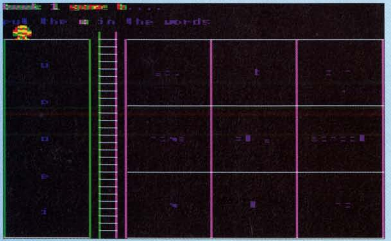
The counter argument will be that these games have been used successfully in schools. But a school will wrap them up with a range of extensions and other activities unlikely to exist in the home.



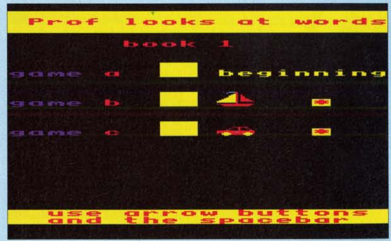
```
Prof looks at words
book 1
game a    beginning
game b    vowels 1
game c              1
use arrow buttons
and the spacebar
```

Summing up

If you have used Prof Plays a New Game and your child seems happy to keep playing, this will be a worthwhile extension. But if you feel they have had enough you'll need to look elsewhere.



```
book 1 game b....
put the a in the words
u
o
a
e
i
```



```
Prof looks at words
book 1
game a    beginning
game b              *
game c              *
use arrow buttons
and the spacebar
```

A feel for words

Marshal Anderson examines two ESM programs to develop spelling

CHARLES Cripps, among others, has been developing an approach to the teaching of spelling that is becoming widely accepted in schools. His ideas suggest that spelling involves a very important visual aspect along with the phonics that form such a core of reading and spelling in schools.

The basic idea is that children will learn to recognise certain letter patterns within words and that this can form the basis for learning to spell.

This works not necessarily against, rather alongside, the phonic approach to learning the sounds of words.

Perhaps most of us don't realise how much we depend on visual clues for spelling, but we are unlikely to be able to judge the correctness of a spelling until we see it written down.

This is especially true of English, which uses so many similar combinations of letters to create different sounds. The upshot of these ideas has been the look – cover – write – check approach to teaching spelling, and this is implemented in two packages from Mr Cripps and ESM.

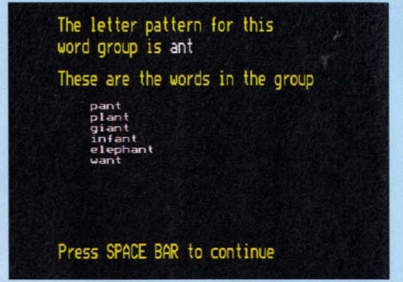
An Eye For Spelling as been around for a few years now and used in many schools with a great deal of success.

The package contains 3,500 or so words grouped into word lists based on letter patterns. The word lists are then grouped according to age, so we see lists ranging from *ag* words – bag, wag and rag – to *ierce* words like pierce and fierce.

It is important to point out that, because of the visual approach, you will find *sew* and *new* in the same list.

Having selected the age group you want you can choose a word list to use. There are full editing facilities, so there is no need to feel stuck with the lists provided, extensive though they are.

You could tailor lists to a particular child, group or project, as long as they have a letter pattern in common. Once you have selected your letter group you set the time the children will see each word for and decide whether they see the words formed on screen around the letter pattern or go straight on to the main activity. The child is shown the word list and told the letter pattern they have in common. There's a lot of reinforcement here with the pattern animated around the screen.



```
The letter pattern for this
word group is ant

These are the words in the group

          pant
          plant
          giant
          infant
          elephant
          want



Press SPACE BAR to continue
```

Product: Hands and Eye on Spelling
Price: £32.50 excl. VAT (Hands on)
£25.00 excl. VAT (eye on)
Supplier: ESM, Abbeygate house,
East Road, Cambridge, CBI 1DB
Tel:0223 65445
Requirements: BBC B, B+ and Master

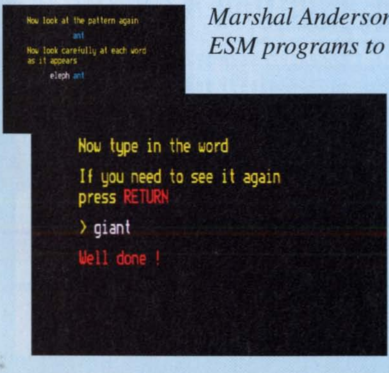
When selected, each word is built around the letter pattern. All this goes on in clear, uncluttered, Mode 7 double height letters with a refreshingly restrained use of colour.

The interactive part of the program shows the child a word from the list for the pre-set time, clears it off the screen and invites the child to type it back.

If they get it wrong they are shown the correct spelling and then start the process again. Having been through all the words in the list the sequence ends by once again showing all the whole list.

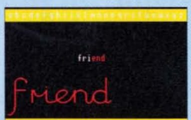
Once children have finished they, or their teacher/parent, can review the attempts they made at each word and send the results to a printer. The program then offers a return to the settings menu, or the next child or group can run through the same list.

This sort of setup can cause problems in use, due to the short time each child or group of children spend at the machine. You could try to use this program in an ad-hoc way by sending children to the machine as and when you discover a problem with a letter group. The trouble is

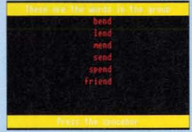


```
Now look at the pattern again

          ant

Now look carefully at each word
as it appears

       eleph ant
```

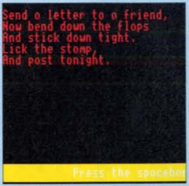
```
Now type in the word

If you need to see it again
press RETURN

> giant

Well done !
```



```
abcdefghijklmnopqrstuvwxyz

            friend

friend

      Press the spacebar
```



```
These are the words in the group
              bend
              lend
              mend
              send
             spend
            friend

      Press the spacebar
```



```
Send a letter to a friend,
Now bend down the flaps
And stick down tight.
Lick the stamp,
And post tonight.







          Press the spaceba
```

A feel for words

Marshal Anderson examines two ESM programs to develop spelling

CHARLES Cripps, among others, has been developing an approach to the teaching of spelling that is becoming widely accepted in schools. His ideas suggest that spelling involves a very important visual aspect along with the phonics that form such a core of reading and spelling in schools.

The basic idea is that children will learn to recognise certain letter patterns within words and that this can form the basis for learning to spell.

This works not necessarily against, rather alongside, the phonic approach to learning the sounds of words.

Perhaps most of us don't realise how much we depend on visual clues for spelling, but we are unlikely to be able to judge the correctness of a spelling until we see it written down.

This is especially true of English, which uses so many similar combinations of letters to create different sounds. The upshot of these ideas has been the look – cover – write – check approach to teaching spelling, and this is implemented in two packages from Mr Cripps and ESM.

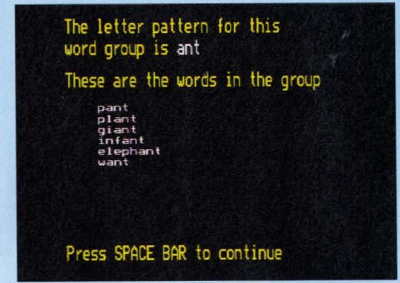
An Eye For Spelling as been around for a few years now and used in many schools with a great deal of success.

The package contains 3,500 or so words grouped into word lists based on letter patterns. The word lists are then grouped according to age, so we see lists ranging from *ag* words – bag, wag and rag – to *ierce* words like pierce and fierce.

It is important to point out that, because of the visual approach, you will find *sew* and *new* in the same list.

Having selected the age group you want you can choose a word list to use. There are full editing facilities, so there is no need to feel stuck with the lists provided, extensive though they are.

You could tailor lists to a particular child, group or project, as long as they have a letter pattern in common. Once you have selected your letter group you set the time the children will see each word for and decide whether they see the words formed on screen around the letter pattern or go straight on to the main activity. The child is shown the word list and told the letter pattern they have in common. There's a lot of reinforcement here with the pattern animated around the screen.



```
The letter pattern for this
word group is ant

These are the words in the group

        pant
        plant
        giant
        infant
        elephant
        want

Press SPACE BAR to continue
```

Product: Hands and Eye on Spelling
Price: £32.50 excl. VAT (Hands on)
£25.00 excl. VAT (eye on)
Supplier: ESM, Abbeygate house,
East Road, Cambridge, CBI 1DB
Tel:0223 65445
Requirements: BBC B, B+ and Master

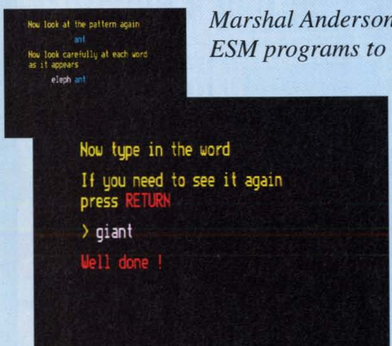
When selected, each word is built around the letter pattern. All this goes on in clear, uncluttered, Mode 7 double height letters with a refreshingly restrained use of colour.

The interactive part of the program shows the child a word from the list for the pre-set time, clears it off the screen and invites the child to type it back.

If they get it wrong they are shown the correct spelling and then start the process again. Having been through all the words in the list the sequence ends by once again showing all the whole list.

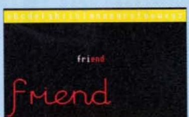
Once children have finished they, or their teacher/parent, can review the attempts they made at each word and send the results to a printer. The program then offers a return to the settings menu, or the next child or group can run through the same list.

This sort of setup can cause problems in use, due to the short time each child or group of children spend at the machine. You could try to use this program in an ad-hoc way by sending children to the machine as and when you discover a problem with a letter group. The trouble is

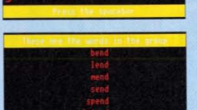


```
Now look at the pattern again

           ant

Now look carefully at each word
as it appears

       eleph ant
```

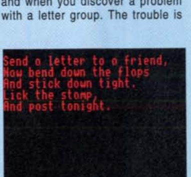
```
Now type in the word

If you need to see it again
press RETURN

> giant

Well done !
```



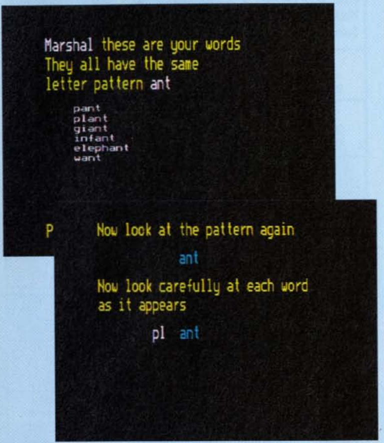
```
friend

friend

Press the spacebar
```



```
These are the words in the group
bend
lend
mend
send
spend
friend
Press the spacebar
```



```
Send a letter to a friend,
Now bend down the flaps
And stick down tight.
Lick the stamp,
And post tonight.

Press the spacebar
```



```
Marshal these are your words
They all have the same
letter pattern ant

     pant
     plant
     giant
     infant
     elephant
     want
```

```
P      Now look at the pattern again

                 ant

       Now look carefully at each word
       as it appears

                pl  ant
```

that few of us can have a machine standing in the corner just waiting for a child to spell *freind* all the way through a story.

You may need some sort of recording system and have a dedicated session once a week or day. You would get a lot of children through in a short time and I have found silent reading a good slot for individual children to use this package.

Hands On Spelling, written with Janet Ede, takes things a step further. Still based on word lists, it also includes emphasis on the physical act of writing as part of the spelling process. The word lists are divided into 10 groups of eight, grouped by complexity, each group held on one overlay. There are fewer words and lists in this package, the age range being about five to eight years, and you do not have the facility to create your own lists.

Overlays come as Concept Keyboard overlays or function key strips allowing the child to access any one of the eight letter patterns and their respective list. The Concept overlays include an enlarged keyboard as well as the letter patterns.

Having asked for a letter pattern, the program goes through a similar sequence to Eye For Spelling, but in addition shows the word being written in a joined hand to reinforce the motor aspect of spelling.

The words are then presented as a list and then are blanked out one at a time for typing back. It was nice to do this with the rest of the list still on the screen.

Once all the words have been entered a poem showing them in context is revealed.

The materials supplied are excellent photocopyable poems with illustrations, key strips and both Concept Keyboard sizes. There is also an alphabetical keyboard overlay to replace the qwerty arrangement – bound to cause controversy.

Summing up

Both these packages have a place in aschool using this approach to spelling. They can have different functions – Hands On Spelling encourages a child to explore the patterns on the overlay and can be seen more as an end in itself than Eye For Spelling, which seems to give a more specifically targeted approach and also goes further up the age range.

They are well presented, clearly documented and have a very solid educational basis. Eye For Spelling, with its huge word list, is also a package worth buying for home use.

IT's time for awareness

Rog Frost examines four products to help teachers with the introduction of IT into the secondary school

THIS suite of teacher in-service training materials is designed to raise the awareness of issues related to information technology. In Coach Lane Comprehensive the software takes you on a tour of this fictitious school.

A number of activities take place along with a comment. Your simple task is to guess who made the comment. Teachers involved in IT in secondary schools will not find this a problem.

Paper materials allow for extension work, but it all comes with the clear message that IT should,indeed must, be spread across the curriculum. Also, pupils should be using IT in meaningful and relevant situations.

With materials aimed at all groups including the senior manager within a school, it is intended that ideas from Coach Lane should be transferred to real institutions.

IT 1995 starts by supposing that the world is perfect. It poses the question: *Where do you want your school to be in 1995?*

An easy to manage disc – ideal for non computer-literate heads – poses the questions and allows responses to be typed in. This typed information can be converted to a word processor file for printing.

Product: Coach Lane Comprehensive; Making IT Happen; IT 1995; IT Toolkit
Price: £15 each; Making IT Happen £10 paper materials only; IT Toolkit £12.50 paper materials only
Supplier: Northern Micromedia, Resources Centre, Coach Lane Campus, Coach Lane, Newcastle upon Tyne NE7 7XA.
Tel: 091 270 0424
Requirements: BBC B, B+ Master, BBC A3000 and Archimedes series

Again aimed at groups of teachers with a manager, this program can lead a school to the development of a policy for Information Technology.

Making IT Happen takes each of the traditional areas of the school curriculum and suggests possible strategies for implementing IT. Benefits to pupils are stressed, but no attempt is made to hide possible pitfalls.

The final pack, **The IT Toolkit** is aimed very much at the IT coordinator. It consists of a set of forms for collecting data – doing an IT audit seems to be the current jargon phrase.

Whether you want information from pupils about their IT experiences or heads of departments concerning provision of training , the form is there. So too is the grid on which you can record and distribute your findings.

Summing up

The Coach Lane activity is a good starting point for schools struggling with implementing the National Curriculum. It provides a safe environment – the fictitious school – so that teachers can express their fears and worries. It also pinpoints potential problems such as male domination of computer hardware.

IT 1995 is also a useful pack. It poses meaningful questions and allows groups of users to express themselves in an uncluttered format. Making IT Happen is the best pack. These subject-based sheets are clearly written by people who know what they are talking about. All secondary schools should buy these materials.

This leaves The IT Toolkit, which is the one I would leave on the shelf. The fact that it is based on applications – word processors, databases and so on – now seems wrong. The Strands approach – Communicating Ideas, Handling Information, Modelling, Measurement & Control and Evaluating Applications and Effects – is surely the way forward as teachers strive to introduce the IT National Curriculum across all subject areas.

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In the beginning...

Don Lewis discovers how the BBC Micro came into existence

THE 100th birthday of *The Micro User* is a direct result of three frantic days and two sleepless nights in the Autumn of 1979 when two men of vision and the small staff of their embryo company virtually threw together the basics of a new computer.

Herman Hauser and Chris Curry were the two men, Acorn Computers was their company and the result of their efforts was the BBC Micro – the phenomenally successful machine around which *The Micro User* was launched.

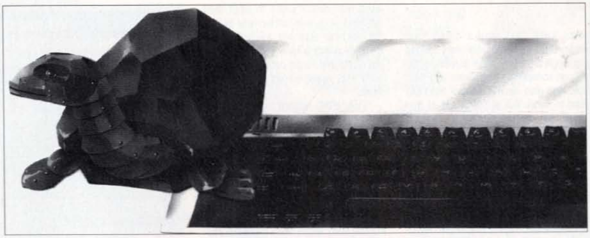
Incredible though it seems, the computer which has achieved sales of more than 1.5 million was just a list of specifications on the Monday of that momentous week but a working prototype by the Friday morning.

Hauser and Curry had founded their company in 1979 when they launched their original machine, the Atom. They were planning a second computer – the Proton. It was a machine designed to be all things to all people, featuring twin processors: A front end handling the input and output with the option of a variety of other processors to handle different operating systems, different industrial standards and add-ons.

It was then that they heard the British Broadcasting Corporation were having problems finding a machine for their Computer Literacy Project.

The BBC had been working with Newbury Computers whose New Brain machine was a possible contender but after a lengthy period, the project was not progressing.

"After two years, they still had no prototype and thought two years was long enough", said Herman Hauser. "They asked six companies to tender for the work. Acorn Computers was one of them and the others included Sinclair, Tangerine and Research Machines.



"The BBC came up with a specification on the Monday. At that time we had the concept of our next machine – the Proton – but no hardware. On the Monday evening, I got some ideas together and asked the development staff if there was any possibility of getting the prototype by Friday.

"They thought I was crazy but said if it had to be done then they would give it a good try. In two nights and three days, we produced this machine from scratch".

The BBC were due at Acorn to see the prototype at 10.30 am on the Friday but as the sun came up, it was still not working because of problems with an extraneous clock signal that hadn't been disconnected. With a bit of quick last-minute thinking by Hauser, the problem was solved and the demonstration went well.

"They saw the hardware working but did not, at that time, know what the machine would look like", added Hauser. "Afterwards, Chris Curry did a magnificent job on the model. He produced the look of the BBC Micro.

"We thought the BBC had actually overspecified the machine they wanted. Everyone else felt the specification was very difficult and couldn't be done. In fact, we exceeded the specification they put on it when others did not even meet it".

Although it was only ten years ago, the era which saw the BBC Micro's birth was a different world for computer developers.

"In those days you could do things quickly and we were used to working at speed", added Chris Curry. "This is not the case now. Everything is more institutionalised with more formal requirements when developing machines, imposed by existing market standards which didn't exist then.

"The development of our prototype

➤

Herman Hauser

➤

was very fast and I think that impressed the BBC. We were helped by the fact that we were already working on something which was very flexible and also similar to what the BBC had in mind. But in the space of that week, we rewrote the Basic, cobbled together the operating system and built the hardware to show the BBC a basic concept for what would become the BBC Micro.

"With the BBC Micro, we were bringing out an entirely different computer with entirely different processing capabilities. But there were more opportunities for ingenious new ideas to be brought into the market then.

"In the short time we had, we didn't just produce the specification the BBC wanted but we also had to present an argument for the modifications which we felt were necessary. We were fortunate that we were able to use existing hardware modules from our previous products to give an emulation of what the machine would do.

"On that Friday, the BBC saw a 6502 microcomputer which was close to the specification they had stipulated with output close to what they required. It took a further year before the machine went into production and we were actually late. We were using uncommitted logic arrays and difficulty was experienced in producing them.

"The BBC Micro was always designed to be a long-lived entity. We had to think a long way ahead and we had every intention of making a machine that would be very popular. But I never really expected it to be as successful as it has been".

Both Hauser and Curry paid tribute to the help they received in developing the BBC Micro from research students Stephen Furber and Roger Wilson. In those days, they worked in close collaboration with their near neighbours at Cambridge University Microcomputing Club.

"Stephen Furber was doing a Rolls Royce fellowship at the university at that time and he was actually designing a fruit machine on our behalf", added Curry. "It was to be one of the first microprocessor controlled fruit machines. In those days, we used to work closely with individuals at the university and their expertise was readily available to us. Now, the situation is more formal with commercial organisations attached to university departments".

Such was the success of the BBC Micro that soaring demand could not be met. In January 1982, production was 1,000 a week; in February it went up to 2,500 and in March, 5,000. But demand kept increasing and by April the backlog exceeded 20,000.

By mid-1982, the pressures on Acorn were intense. Rapid expansion was brought in and by October 1982, the backlog had almost disappeared with more buyers opting for the 32k Model B in preference to the 16k Model A.

When market demand slowed down, Acorn faced the problem of what to do with their large and streamlined operation.

Eventually, in 1984, Olivetti paid £14 million for 80 per cent of the company. And this helped to keep Acorn afloat until the steady sales of the Model B, then the Master, culminating in the ARM chips and the Archimedes machines.

Where are they now?

Herman Hauser became vice-president of research for the Olivetti Group and retains the post of Chief scientific director for Olivetti. He co-founded his latest project, The Active Book Company, in 1988 and has continued on his pioneering way by developing a book-sized machine bsaed on Acorn's revolutionary ARM chip set which recognises handwriting, replacing the traditional screen by a special pen. The launch of Active Book is imminent.

Innovation is also the continuing watchword of Chris Curry who is now working on Keyline, a complete home information system which includes such services as home shopping and home banking accessed through free terminals. Users give it a problem and the system gives them the right person down the telephone line.

There are plans to ship three million terminals in the first two and a half years.

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Acorn's future

Mike Cook wonders if we will ever live to see the oak tree

THE *Micro User*'s 100th issue seems an appropriate place to speculate about the future of Acorn Computers and what we can hope to see over the next 100 issues. However, to understand the future demands an understanding of the past.

It is difficult to imagine now how impressive the original Model B was at its launch. It had high resolution colour graphics with the ability to add text on the same screen. Something we take totally for granted now but was rare in those days.

Also, while disc drives were around, they cost more than twice as much as the computer, so not many people had them. The same went for monitors. The BBC Micro has always been short of memory, 32k ram was smaller than the 48k Tandy system I had been using for three years BB – Before Beeb.

Nevertheless at that time we might have predicted many of the changes that came to pass in our everyday experience of computers. For, in a very real way, most of the future has already happened. The rest of it is still a twinkle in a developer's eye.

Having said this it is also instructive to see what was being predicted then and look at the state now. The most widely tipped improvement was that of voice input. Computers were going to be able to take dictation converting your spoken word directly on to the screen. That, as we all know, has not happened and the technology is still as far away from that as ever.

Remember bubble memory? That promised high density solid state memory. By the time it arrived, magnetic technology had overtaken it so that you could get as much information on to a floppy disc as into a bubble memory unit.

So what does the future hold for us? Well, it's fairly safe to predict that memory prices will continue to fall and that our computers will get larger and larger memories. However, if the past is anything to go by, this will simply mean that programmers and compiler writers will get more sloppy with their techniques. I heard a good example of this the other week:

Apparently the person converting the game Sim City from the Amiga to the Model B was horrified to discover that the Amiga version used a 32k array to determine if the various sections of the city were connected to the electricity supply. This is more than the Model B has in total.

The programmer produced a much better algorithm with the result that it used much less space and that part of the program actually ran faster on the 6502 than the 68000 processor. So a doubling of memory will not necessarily mean a doubling of the machine's capability.

Mass storage devices will continue to fall in prices. Already many people have a hard disc and these will become even more common.

It's the optical disc that offers the next leap in performance. There are already *Write Once, Read Many* or WORM drives that offer gigabytes of storage available at ever reducing prices. However, it is probably the *Write Many, Read Many* optical discs that will find most favour with the computers of the future.

One thing that hasn't changed over the years is that fact that a personal computer equals a single processor. Despite a brief flirtation with second processors, the computer market has stayed firmly at *one man, one processor.*

The reason for this is that Acorn's second processors were add-on units that took over the calculation, leaving the original processor to handle the display. This sounded like a fine idea at the time, but in fact what happened was that the graphics capability of the original machine caused a bottleneck, slowing down the second processor. So in effect, it was quicker to get the newer processor to do everything.

The idea is not dead, however, and with Acorn's link up with Apple it would be nice to see a 68040 processor running the Apple software with a ARM 3 chip handling the user interface.

Something like this already exists as an option in the Apple range but there is the bottleneck on the Nu Bus that the two processors communicate through. What is needed is a transfer of Apple's operating system to the ARM chip enabling a more symbiotic operation of the two processors.

Parallel processing has been *the coming technology* for a few years now, be it Transputer or ARM-based. So will we see a parallel architecture in the computers of the future? The big stumbling block with these has been the development of a suitable parallel language. Although these exist they have not been particularly successful.

The quest for more computing power will drive research on but progress is a lot slower than had first been hoped. Perhaps the best chance for increased power is the integration of processor and memory. It is this that makes the ARM 3 chip so powerful.

In this, a simple 4k of memory is built into the chip, making it possible to execute loops without having to slow down the processor to access external memory once the loop has been initially read in. In the future we could see much larger memory caches like this, maybe enough to contain the whole processor address space.

How can we expect the graphics capability of the computer to improve? Well it can be said from the

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start that the Archimedes is not among the best quality graphics machines in the same way that the Model B was at its launch. Let's hope it will catch up. First of all we need a system where there are more than 16 programmable palette registers.

This is perhaps the greatest limiting factor in the present range of Acorn computers. Clever design has allowed a pseudo 256 colour mode but it is not very good as the colours are evenly distributed in colour space. This means that it is impossible to produce the subtle shading and photo-realism found in other computers. This lack has limited the acceptance of Acorn computers in the graphic design and layout field. Allied with this is the limit on 8 bits per pixel which gives only 256 different colours on the screen at any time. In order to be compatible with a top quality system like the Apple Macintosh there needs to be a screen mode with at least 24 bits per pixel.

Such a system would almost demand a twin processor set-up or some method of preventing the display burden clogging up the fast ARM processor. In fact a new product soon to be available will go some way to handling this disastrous lack.

Most of these points have been made about computers in general but what we are interested in, as users of Acorn's computers, is whether Acorn will be there to make these steps or will they be made by some one else? Acorn has made great efforts to maintain a range of computers that are, broadly speaking, compatible.

Indeed I can take a complex program I wrote eight years ago for the Model B and run it on an Archimedes without modification and at a greatly increased speed. This is something that so-called "industry standard" computers couldn't claim.

As users of Acorn computers we have been lucky that we haven't had to learn a whole new set of tricks as each new computer was released, but simply add to those we know already. No other computer manufacturer has maintained such compatibility for so long.

Acorn have even managed to extend BBC Basic so that it is capable of producing Wimp-based programmes. I would like to see this trend continue but it might be a lot to ask – Apple's abandonment of its original Apple II software base when it launched the Macintosh nearly caused complete collapse.

What we have to consider is how Acorn see themselves. They consider that they are a computer research and development company. Anyone involved in trying to sell their machines would agree that they are better at this than they are at marketing and support. The quality of this has gone up and down over the years. It is current going through a down cycle.

Computers from the Acorn range have always found themselves in strange places, as one Acorn employee admitted to me: "About half of our machines go into education and we have no idea where the other half go." In fact where they go is to the dedicated user who likes to program and use his machine to further his own individualistic goals.

Having said that, there is an almost indescribable ***something*** missing from the Archimedes range when compared with a computer like the Macintosh. Most people agree that the Macintosh is "nicer" to use despite the Risc OS DeskTop being much better than the Macintosh. My advice to people looking for a computer has for a long time been: "A Macintosh to use and an Acorn to program".

One trend that looks unstoppable is the rise of UNIX. For those who don't know, this is an operating system used by mainframe computers and high power workstations. Acorn are already making an assault on this sector of previously highly-priced computers. However, let's hope that UNIX doesn't take hold of the home user market as it is a truly awful system. It is powerful and flexible but very messy. It was once described as a guru-friendly system.

This is just considering the hardware but what of the software? Well, I think that the window/pointer system is the main way we will interact with the computer for a long time to come. I say this because it has been thoroughly researched from the ergonomic point of view. Most computer systems seem to be converging on this type of interaction.

Voice control will not take off, even if the technology is developed, not least because you feel such a berk talking to a machine. Look how uncomfortable people are with answering machines – and they don't answer back.

On the applications front however, we will continue to see increasing connectivity. At the moment we can move a picture from a drawing package into a word processor but there will be an increase in "hot links". That is, when you update your drawing it will be automatically updated in the word processor document.

This feature already exists in a limited way but it will be incorporated right across the operating system. For example, I can foresee my interface projects moving voltage readings straight into a spreadsheet.

Increasing speed and memory capacity will allow newer applications like real time image processing or usable expert systems. All this at a price that will decrease, in real terms, considerably. When I looked at the price I paid for my first Model B, I found it was about one month's salary. The same amount today would buy a mid-range Archimedes system yet the difference between the two machines is staggering.

● *There's no doubt about it, there are fascinating times ahead in the area of computing, let's hope that Acorn are there in the thick of it, making a uniquely British contribution*

Down memory lane

Reminiscences by Mike Bibby, Michael Noels, Paul Jones and Barry Woods

WE were sipping our halves in the Ram and Buffer's BBC Micro Memorial Room and I said to Mike Cook: "Do you remember when we were young and innocent, and *The Micro User* was a fledgling?"

"I remember when *I* was young and innocent," he growled fiddling with his ever-ready soldering iron, "and you conned me into writing just two Body Building articles for *The Micro User*. Now I've done a hundred of the beggars."

"Honest, Mike, the cheque's in the post – your round is it?" I lied divertingly. And as he waited patiently for the Ram's LIFO barmaid to make his cup runneth over my mind wandered back.

The first issue of *The Micro User*. How many vatfuls of Robbinton's Old Unsociable was that ago, I wondered?

An amazing time that, though only I seem to remember it as it really was. Cookie can't get his facts straight, or as he puts it,"We couldn't have been that daft could we?"

Well I was. I wanted a computer magazine for the BBC Micro that I could understand – and enterprising publisher Derek Meakin knew a mug when he stumbled over one.

"Why don't you edit one?" he said. "You're just the man for the job." What he meant was: If I could understand it, anyone could. So I did – edit it, I mean. And I even understood most of it. So *The Micro User* was bound to be a success.

Mind you, those first few issues were dicey. You see, we had no writers, so not only was I Mike Bibby, I was Michael Noels, Paul Jones, Barry Woods and half a dozen other people.

Spot the pseudonym soon became a regular pursuit for Micro User buffs. Just to put the record straight, I'm not Pete Bibby: He really is my twin brother, as well as being Nigel Peters and the Bob of "Dear Trev" among others.

The one pen name everyone spotted a mile off was Jim Notman – except that that really is his name. He was the first person I met to have disassembled the MOS and Basic roms. I suppose I should have expected that from a lecturer in anatomy.

Mind you, having no writers was the least of our worries. We didn't even have a BBC Micro for the first two issues. And everything was done on tape – no discs then. The fact that the original MOS had a bug which made saving to tape unreliable only spiced things up.

Still, we weren't the only ones a little bewildered. I'll never forget my first meeting with Chris Curry, when he told me that sideways rom boards would never catch on.

Exciting times those. Then again, it was an exciting machine. Now, a hundred issues on, Acorn has done it again with the A540 and every copy of *The Micro User* still has that special fascination.

Of course, I don't work there anymore. Mike Cook still writes though – and he's not a figment of my imagination. At least, if he is, he gets served quicker at the bar than I do.

On second thoughts, perhaps he only truly exists on paper. My favourite memory of those early years was the lady at one of our shows who asked him if he really was Mike Cook.

"Yes, of course I am. Ask Mike Bibby," he said earnestly.

The lady paused. "That's funny", she said,"you seem taller from your writing."

The Sampler and MIDI Card

£69 exc VAT - Econet Version

The sampler and MIDI card opens up the exciting world of sound manipulation and control at a price that allows everyone to join in.

The card fits neatly in the Econet socket inside your machine thus leaving your podule slots free for other upgrades. It has no unsightly cables protruding from the machine - all leads connect via an adapter directly to the standard Econet socket.

Even though the cost may be low, specification and quality haven't been skimped on. The board is an 8-bit sampler with variable sample rate capable of sampling at up to 250 Khz with input via a 3.5mm jack allowing connection to Hi-Fi's, CD players, Walkmans etc. The software supplied supports a range of features including over-sampling, sample rate conversion, and software filtering. Waveform editing is possible with facilities to view the waveform (including real-time analysis), fade in/fade out, and cut and paste features. The samples produced are perfect for use in other packages such as Tracker and Armadeus.

The MIDI side provides 16-channel MIDI IN and MIDI OUT and the supplied software emulates the latest version of Acorn's MIDI software. This allows it to work with programs that can run using Acorn's podule and their software.

Tracker

£49.95 inc VAT

Tracker is the perfect complement to the Sampler and MIDI card. It is a full 8 channel sequencing package that creates stand-alone music modules which will play on the Archimedes without any need for extra hardware. Using the supplied samples (over 150 of them!) or your own, you can create complex pieces of music with Trackers many advanced features including:

• Pitch bend (portamento) • Arpeggio • Stereo Panning • Volume Slide • Track Swapping and Mixing •
• Note entry either via the Archimedes or MIDI keyboard •

A number of complete songs are supplied together with a comprehensive manual explaining all the facilities in detail. Extra music disks (Numbers 2-10) are available at £4 each.

SPECIAL OFFER: SAMPLER/MIDI CARD + TRACKER FOR ONLY

£99 exc VAT

The Joystick Interface

£23.95 exc VAT

• Plugs into the parallel printer port • No special support necessary • Control modules supplied for most games •
• Comes complete with software to mimic key presses • Programming language supplied for complex modules •

"The programming language and the compiler enables the joystick....to be used to control virtually any piece of software. Since the RTFM interface does not do this, **The Serial Port's effort is the best buy of the two.**"

Acorn User February 1991

The Serial Port, Burcott Manor, Wells, Somerset BA5 1NH
Tel: 0243 531194 Fax: 0243 531196

Help celebrate our birthday with this

Super £4,500 cent

TO celebrate our 100th issue, the top companies from the Acorn world have got together with *The Micro User* to present you with a challenge and an amazing array of prizes worth over £4500.

First Prize

FOR the successful first prize winner there's a weekend for two in Paris, staying in a four star hotel in the centre of this beautiful city. The lucky couple will leave from London in September and enjoy all the spectacular sights Paris has to offer.

Second Prize

Opus Supplies will present the lucky second prize winner with over £500 worth of computer furniture, including desk, printer stand and chair.

Runners Up Prizes

● Games, Games, Games

Superior Software have 10 games on offer – you can choose from their extensive range of Electron, BBC Micro and Archimedes games.

Fourth Dimension are giving away any 10 games from their wide selection for the BBC Micro and Archimedes.

While **Cygnus Software Engineering** have five copies of each of their latest Archimedes releases: Tower of Babel, Iron Lord and Twin World.

The Serial Port have two games for Archimedes games players – Mindscape and Blowpipe – which must be won plus the latest in joystick interfaces for the Archimedes.

But if you want to be a master of your own destiny then there are two copies of Creator – the Arcade Games Designer from **Alpine Software**. Following on from the highly successful ALPS for the Electron and BBC Micro, this new Archimedes designer is not to be missed.

Minerva have been developing games for the Archimedes since it was first released and you can win one from four of their best: BugHunter, BugHunter in Space, Thundermonk or Orion.

Checkmate! **MicroPower** have offered 10 copies of their superb Archimedes/BBC A3000 Chess program, featuring 3D board view, playback and rewind, set board to play out particular positions and much more.

● Hardware, Hardware, Hardware

Only for Electron owners are three copies of Click from **Slogger**. At £59.95 each this piece of hardware will allow Electron users to perform a wide variety of different functions all at the click of a button.

Ian Copestake's ideA range of hard drives have had rave reviews since their release and they are offering you a choice of hard disc upgrade. If you have a BBC A3000 you could win their superb hard disc which normally retails for £375, while A310 owners could add a 40Mb hard drive to their system which would usually cost £299.

No room? Well **Pres** are offering BBC A3000 owners their unique plynth-style monitor stand. Not only will it save you space but is both attractively and ergonomically designed. While Electron tape users could upgrade with the ever-faithful Plus 1.

● Applications, Applications, Applications

PLUS we have a whole host of useful programs for you to use on your computer:

Educational specialists **4Mation** have a copy of Poster for you. You can design posters and pages inside and out of the classroom – your imagination being the only limit.

Clares are offering two copies of Schema for those of you who need a business quality spreadsheet on their Archimedes, while they will test your composing skills with two copies of Rhapsody II exclusively packaged with their latest release VoxBox. This lets you create and edit the Archimedes' relocatable voice modules by using sampled or synthesised sound to the full.

Veterans of the Acorn scene **Computer Concepts** are giving away a copy of Equasor and one copy of Impression Junior.

Watford Electronics will provide one complete copy of their best-selling paint program for the 8 bit BBC Micro, Quest Paint, complete with

1

2

3

4

5

6

Entry Form

Name

Address Postcode

Telephone Age

Answers

1

2

3

4

5

6

Tiebreaker

The initials A.C.O.R.N. might stand for:

A

C

O

R

N

If I win the top three prizes I would like (in order of preference)

1

2

3

My computer is

enary competition

Quest Mouse for easier brush work.

The latest in 16-bit Real-Time Video Digitising must be won from **Pineapple Software**. Supplied with two fully multitasking applications you can plug the hardware into the back of your Archimedes and let the powerful software digitise the full video area as you see it on a TV, with smooth colour graduation and the RGB input for high quality pictures worth £315.

Do you want to use all that useful information on Teletext? There are two teletext adaptors on offer from **Morley** – one for the Archimedes and one for the 8 bit machine, together worth £229.

For the more program minded there is a copy of Archway 2 from **Simtron** which must be won. Worth £99.95, you can unleash the power of Risc OS and build powerful multi-window applications with pop-up menus, icons, mouse control and much more.

Minerva reappear with their integrated package: Desktop Office for the Archimedes. Now you can have a word processor, database, communications package not only in one package but you can transfer data between them too.

Database Direct are giving away 10 subscriptions to *The Micro User*.

In need of education? Fun School 3, available on all Acorn formats from **Europress Software,** is another of the fantastic prizes. There are three sets of the BBC version (one from each age group) among the prizes.

What to do

All you have to do is look at the five past covers of *The Micro User pictured here* and spot the year they come from. Hint: The first issue of *The Micro User* was in 1983. Then complete the tie-breaker in the wittiest and most original way you can.

Fill in the entry form and make sure that this arrives at *The Micro User* no later than June 28, 1991.

THE
100th
ISSUE

Scan-Light Junior 256

A completely new version of Scan-light Junior that brings, for the first time, low cost true grey-scale scanning to the Archimedes.

The hardware

- The only scanner currently offering true 256 grey-level scanning. 105mm scanning width.
- Special 176 grey-mode output for typesetting (overcomes the 16 grey-limit inherent in Acorn's printer drivers).
- Four scanning modes;
  - Monochrome black & white
  - Dithered black and white
  - 16 grey-level
  - 256 grey-level
- Four resolution selections to 400 dpi.
- Max scanning resolution 400 dpi at 16 grey-level or 200 dpi at 256 grey-level.
- Brightness control.

The software

- Instant rotation of image to any angle
- Image sampling to reduce moiré patterning from printed material.
- On-screen dithering to provide 61-grey-levels from 16 colour screen modes. Provides the most accurate possible screen representation.
- Gamma curve editing that not only provides full contrast and brightness control but also allows non-linear corrections to compensate for particular printers or typesetters.
- Output options enable sprites to be saved as monochrome, 16 or 176 grey-levels.
- Sprites from any source can be loaded.
- Image horizontal and vertical flip.
- Image crop to any rectangle.
- Scale view of image (either original or enhanced) to any size.
- Original scanned image data is not affected by any enhance operations so it is always possible to undo back to the original.

The upgrade

Due to the advanced re-programmable gate-array design used in our Scan-Light interface board, existing Scan-Light Junior owners can purchase the scanner head and software only, allowing the new scanner to be used with their existing boards.

Warning - due to the size of scanned grey-scale images 2Mbytes of RAM is the minimum recommended. (The two pictures on this page take approximately 250 Kbytes each.)

The bottom line

Scan-Light Junior 256 complete (interface, scanner software and manual)

.... ***£220+VAT (£258.50 inc)***

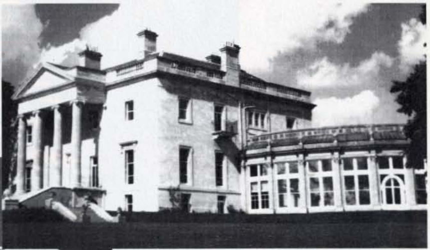
Scan-Light Junior 256 (A3000) complete internal version for A3000 owners

.... ***£220+VAT (258.50 inc)***

Upgrade for existing Scan-Light Junior owners (scanner, new software and documentation)

.... ***£149+VAT (175.07 inc)***

Both of these pictures were scanned from photographs using Scan-Light Junior 256. The images have a resolution of 150 dpi and are reproduced at actual size. This entire page was created in Impression and typeset directly from Impression.



Computer Concepts Ltd

Gaddesden Place, Hemel Hempstead, Herts,
HP2 6EX Tel 0442 63933 Fax 0442 231632

Please check availability prior to ordering

OLLIE is in trouble: As a prospective buyer of an old castle he was inspecting the condition of the extensive dungeons – and coming to the conclusion they were in need of a good layer of damp-proofing.

Unfortunately the estate agent had failed to mention that the dungeons were inhabited by monsters and bats which disliked having their unpleasant apartments invaded.

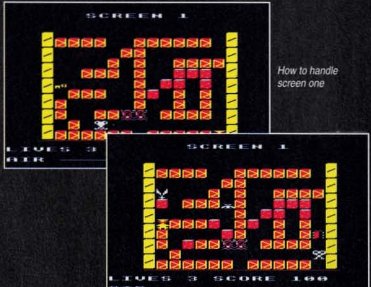
So they've locked him in, magically hidden all the doors, and set spear traps for him. The only solution is for Ollie to grab the key – usually bait for some cunning trap – at which point the door will appear, and he can escape to the adjoining dungeon.

To make matters worse, each cell is sealed, so there's only a limited amount of air available.

Luckily Ollie has the ability to build and destroy a certain type of building block, which means he can block off some routes and open others, as well as using the blocks to climb up to the key or door.

So type in the program and use the checksums to ensure you've made no typing mistakes, save and run it.

Remember, every level can be completed – it just takes some thought.



How to handle screen one

For Sale
One castle
Comprising:
8 Dungeons
3 Ante-chambers
2 Rest in Peace rooms
All new fixtures and fittings including gold plated Manacles and Chains

BLOC BUSTA

Donald Ross presents a game of mammoth proportions.

```
 10 REM > <BasicSave$Dir>.BlocBusta
 20 REM by Donald Ross
 30 REM (c) The Micro User
 40 PROCenv:PROCchars
 50 DIM M$(1),V$(1),N$(8),SC%(8)
 60 FORI%=1TO8:READN$(I%),SC%(I%):NEXT
 70 DATA BUSTER,25000,BASHER,18500
 80 DATA THUMPER,15000,CHANCER,12000
 90 DATA CRACKER,10000,GNASHER,7000
100 DATA CRUSHER,4000,GRINDER,2500
110 MODE7:VDU23,1,0;0;0;0;
120 PROCin:PROCdef
121 ONERRORMODE7:REPORT:PRINT" at ";ER
L:END
130 REPEAT MODE5:PROCst
140 TM%=TIME:TB%=TIME
150 REPEAT
160 IF TIME>TM% PROCmov:TM%=TIME+9
170 IF TIME>TB% PROCall:TB%=TIME+17
180 IFX%=XD%IFY%<YD%IFFL%=0PROCsp
190 IFd%=1ORtime<=80PROCded
200 UNTILtime<=80ORLI%=0ORd%=1
210 SCR%=SCR%+1:UNTIL FALSE
220 DEFPROCin
230 VDU22,7:LI%=3:SC%=0:tb%=1:FG%=0:EL
I%=0
240 PRINTTAB(11,3)CHR$141CHR$129;"BLOC
```

➤

➤

```
BUSTA"TAB(11,4)CHR$141CHR$131;"BLOCBUSTA
"TAB(4,8)CHR$130"Z - LEFT"SPC7"X - RIGHT
"TAB(9,10)CHR$130"SHIFT - JUMP"
  250 PRINTTAB(13,12)CHR$130"< - BUILD/B
UST(L)"TAB(13,14)CHR$130"> - BUILD/BUST(
R)"
  260 PRINT'TAB(9)CHR$130"Sound on?";:S%
=FNyn
  270 PRINT'TAB(9)CHR$132"Timer on?";:TI
M%=FNyn
  280 IFS%:*FX210,0
  290 IFNOTS%:*FX210,1
  300 REPEAT UNTIL GET=32:SCR%=1:ENDPROC
  310 DEFFNyn:REPEATZ%=INSTR("YyNn",CHR$
(GETAND&DF))
  320 UNTILZ%:PRINTMID$("YyNn",Z%,1):=Z%
<3
  330 DEFPROCdef:RESTORE420
  340 FORZ=1TO17:READX:A$=A$+CHR$X:NEXT
  350 FORZ=1TO17:READX:B$=B$+CHR$X:NEXT
  360 FORZ=1TO15:READX:O$=O$+CHR$X:NEXT
  370 FORZ=1TO16:READX:S$=S$+CHR$X:NEXT
  380 FORZ=1TO7:READX:BK$=BK$+CHR$X:NEXT
  390 FORZ=1TO7:READX:M$(0)=M$(0)+CHR$X:
NEXT
  400 FORZ=1TO7:READX:M$(1)=M$(1)+CHR$X:
NEXT
  410 FORZ=1TO15:READX:D$=D$+CHR$X:NEXT
  420 DATA18,0,1,224,8,18,0,2,226,10,8,2
25,8,18,0,1,249
  430 DATA18,3,3,224,8,18,0,1,227,10,8,2
25,8,18,0,2,228
  440 DATA18,0,2,230,8,18,0,1,231,10,8,1
8,0,2,232
  450 DATA18,0,3,243,10,8,244,8,11,18,0,
1,246,8,10,247
  460 DATA18,0,0,255,10,8,255
  470 DATA18,3,3,233,10,8,234
  480 DATA18,3,3,236,10,8,235
  490 DATA18,0,3,237,8,10,239,8,18,0,1,2
40,11,8,238
  500 V$(0)=CHR$241:V$(1)=CHR$242
  510 DD$=CHR$18+CHR$0+CHR$3+CHR$253+CHR
$10+CHR$8+CHR$254
  520 SP$=CHR$18+CHR$0+CHR$3+CHR$250+CHR
$10+CHR$8+CHR$251
  530 ENDPROC
  540 DEFPROCst:VDU26:CLS
  550 IFSCR%>80PROCcongrats
  560 IFELI%=20 LI%=LI%+1:ELI%=0
  570 VDU4:PRINTTAB(6,2)"SCREEN ";SCR%+F
G%TAB(0,28)"LIVES ";LI%TAB(8,28)"SCORE "
;SC%TAB(0,30)"AIR ":VDU5
  580 VDU29,176;164;:MOVE0,0:GCOL0,1:DRA
W960,0
  590 IFSCR%>20 SCR%=1:FG%=20
  600 RESTORE(2020+(SCR%-1)*20):READ zy1
%,zy2%
  610 FORV%=1TO3:READcol%:VDU19,V%,col%;
0;:NEXT
  620 PROCset:PROCsds:PROCrd
  630 READX%,Y%,BX%,BY%,MX%,MY%,DX%,DY%,
KX%,KY%,XD%,YD%
  640 VDU25,4,KX%;KY%;10,18,0,2,245
  650 PROCvrs:GCOL0,3:VDU25,4,XD%;YD%;25
2
  660 ENDPROC
  670 DEFPROCmov:*FX21
  680 PROCt:W%=POINT(X%,Y%+56)=0
  690 Z%=POINT(X%+64,Y%-24)=0
  700 G%=POINT(X%-64,Y%-24)=0
  710 IFINKEY-1IFPOINT(X%+32,Y%-64)<>0IF
W%PROCjmp:ENDPROC
  720 IFINKEY-67IFX%<832IFZ%X%=X%+DIR%:P
ROCpt
  730 IFINKEY-98IFX%>64IFG%X%=X%-DIR%:PR
OCpt
  740 IFINKEY-103PROCbl:ELSEIFINKEY-104P
ROCbr
  750 IFPOINT(X%+4,Y%-4)=3 ORPOINT(X%+4,
Y%-64)=3 d%=1
  760 IFPOINT(X%+4,Y%-48)=2PROCk
  770 IFK%=1IFX%=DX%IFY%=DY%PROCdor
  780 IFPOINT(X%+32,Y%-64)=0PROCdw
  790 ENDPROC
  800 DEFPROCbr:P%=POINT(X%+64,Y%-48)
  810 IFP%=0MOVEX%+68,Y%:SOUND1,2,100,1:
PRINTB$ELSEIFP%=1MOVEX%+68,Y%:SOUND0,1,6
,3:VDU9,127,10,9,127
  820 ENDPROC
  830 DEFPROCbl:P%=POINT(X%-60,Y%-48)
  840 IFP%=0MOVEX%-60,Y%:SOUND1,2,100,1:
PRINTB$ELSEIFP%=1MOVEX%-60,Y%:SOUND0,1,6
,3:VDU9,127,10,9,127
  850 ENDPROC
  860 DEFPROCpt
  870 VDU25,4,OX%;OY%;9,127,10,9,127
  880 OX%=X%:OY%=Y%:VDU25,4,X%;Y%;
  890 PRINTO$:ENDPROC
  900 DEFPROCdw
  910 Y%=Y%-64:PROCpt:DIR%=0
  920 IFPOINT(X%+4,Y%-64)=3 d%=1
  930 IFPOINT(X%+32,Y%-64)<>0 DIR%=64
  940 ENDPROC
  950 DEFPROCjmp:IFY%<=640:Y%=Y%+DIR%:PR
OCpt
  960 ENDPROC
  970 DEFPROCall:IFY%>zy1%IFY%<zy2%PROCm
:ENDPROC:ELSEPROCb:ENDPROC
  980 DEFPROCm
  990 VDU25,4,mx%;my%;18,0,0,255,10,8,25
5
 1000 Q%=(Q%+1)MOD2:VDU25,4,MX%;MY%;
 1010 PRINTM$(Q%):mx%=MX%:my%=MY%
 1020 IFPOINT(X%+64,Y%-8)=3 ORPOINT(X%-3
2,Y%-8)=3 ORPOINT(X%,Y%-8)=3 d%=1
 1030 IFPOINT(MX%+MT%+32,MY%)<>0 ORPOINT
(MX%+MT%+32,MY%-32)<>0 MT%=-MT%
 1040 MX%=MX%+MT%:ENDPROC
 1050 DEFPROCb:IFBY%>=704 BT%=-BT%
 1060 L%=(L%+1)MOD2
 1070 VDU25,4,bx%;by%;9,127
 1080 VDU25,4,BX%;BY%;18,3,3:PRINTV$(L%)
:bx%=BX%:by%=BY%
 1090 IFBX%=X%IF(BY%=Y%+32ORBY%=Y%) d%=1
 1100 IFPOINT(BX%+16,BY%+24)<>0 ORPOINT(
BX%+16,BY%-BT%)<>0 BT%=-BT%
 1110 BY%=BY%-BT%
 1120 ENDPROC
 1130 DEFPROCdor:BO%=time*2:SOUND1,3,0,5
 1140 SC%=SC%+200+BO%:ELI%=ELI%+1:SCR%=S
CR%+1
 1150 VDU4:PRINTTAB(14,28);SC%:PROCst
 1160 ENDPROC
 1170 DEFPROCsp
 1180 REPEAT YD%=YD%-64:SOUND1,5,180,2:D
IR%=0
 1190 VDU25,4,xd%;yd%;18,0,0,255,10,8,25
5
 1200 VDU25,4,XD%;YD%;18,0,3,250,10,8,25
1:xd%=XD%:yd%=YD%
 1210 UNTILPOINT(XD%+16,YD%-64)<>0
 1220 IFPOINT(XD%+16,YD%-64)<>2 SOUND0,6
,60,15:PROCdel(5):VDU25,4,xd%;yd%;:PRINT
BK$:FL%=1:DIR%=64:ELSE VDU25,4,xd%;yd%;:
PRINTBK$:MOVEXD%,YD%-32:PRINTSP$:PROCded
 1230 ENDPROC
 1240 DEFPROCk
 1250 SOUND2,-15,210,2:PROCpt:VDU25,4,DX
%;DY%;:PRINTD$:VDU4:K%=1:SC%=SC%+100:PRI
NTTAB(14,28);SC%:VDU5
 1260 ENDPROC
 1270 DEFPROCt:IFNOTTIM%ENDPROC
 1280 time=time-tb%:MOVEtime-16,-120
 1290 GCOL0,1:VDU229:IFtime<=64PROCded
 1300 ENDPROC
 1310 DEFPROCded
 1320 SOUND1,8,100,15:MOVEX%,Y%:PRINTDD$
:PROCdel(20)
 1330 LI%=LI%-1:IFLI%=0MOVE150,400:GCOL0
,3:PRINT"GAME  OVER":PROCdel(50):PROCend
 1340 PROCst:ENDPROC
 1350 DEFPROCset:time=872:SFG%=SCR%+FG%
 1360 IFSFG%>60 time=time-128 ELSEIFSFG%
>40 time=time-96 ELSEIFSFG%>20 time=time
-64
 1370 GCOL0,3:MOVE90,-120:DRAWtime,-120
 1380 ENDPROC
 1390 DEFPROCsds:GCOL0,2
 1400 FORx%=0TO896 STEP896:FORy%=100 TO6
76 STEP96
 1410 VDU25,4,x%;y%;224,10,8,248,10,8,22
5:NEXT:NEXT
 1420 ENDPROC
 1430 DEFPROCrd:PROCopt
 1440 C%=32:FORR%=1TO11:READC$
 1450 FORA%=1TOLENC$ STEP3
 1460 B%=EVAL("&"+MID$(C$,A%,1))
 1470 Q%=VALMID$(C$,A%+1,1)
 1480 G$=MID$(C$,A%+2,1)
 1490 IFG$="0" G$=""
 1500 IFG$="1" G$=A$
 1510 IFG$="2" G$=B$
 1520 IFG$="3" G$=S$
 1530 Q$="":Q$=Q$+CHR$11+G$
 1540 MOVEB%*64,C%:PRINTSTRING$(Q%,Q$);
 1550 NEXT:C%=C%+64:NEXT:ENDPROC
 1560 DEFPROCopt
 1570 IFSCR%>10IFSCR%<=20GOSUB1660ELSEGO
SUB1590
 1580 ENDPROC
 1590 VDU23,233,&6600;&99FF;&FF99;&66E7;
 1600 VDU23,234,&183C;&3C18;&6624;&E7;
 1610 VDU23,235,&183C;&3C18;&FFA5;&DB;
 1620 VDU23,236,&6600;&BDFF;&FFBD;&3C7E;
 1630 VDU23,241,&243C;&7E18;&DBFF;&2499;
 1640 VDU23,242,&A53C;&FFDB;&187E;&2418;
 1650 RETURN
 1660 VDU23,233,&6600;&C3FF;&A5A5;&3C42;
 1670 VDU23,234,&98A4;&5AC4;&1923;&3D;
 1680 VDU23,235,&1925;&5A23;&98C4;&BC;
 1690 VDU23,236,&6600;&E7FF;&99C3;&3C42;
 1700 VDU23,241,&2424;&7E18;&3CDB;&DB7E;
 1710 VDU23,242,&A5A5;&7EDB;&3C18;&5A7E;
 1720 RETURN
 1730 DEFPROCvrs:OX%=X%:OY%=Y%:PROCpt
 1740 DIR%=64:bx%=BX%:by%=BY%:BT%=32
 1750 Q%=0:mx%=MX%:my%=MY%:MT%=64:FL%=0
 1760 xd%=XD%:yd%=YD%:K%=0:L%=0:d%=0
 1770 ENDPROC
 1780 DEFPROCdel(T%)T%=TIME+T%*10
 1790 REPEATUNTILTIME>T%:ENDPROC
 1800 DEFPROCend:*FX15,1
 1810 VDU22,7,4,23,1,0;0;0;0;
 1820 IFSC%<=SC%(8) THEN1930
 1830 SOUND1,4,100,50:FORT%=3TO4:PRINTTA
B(5,T%)CHR$136CHR$129CHR$157CHR$131CHR$1
41"NEW HIGH SCORE   "CHR$156:NEXT:FORS%=
9TO10:PRINTTAB(7,S%)CHR$134CHR$141"CONGR
ATULATIONS":NEXT
 1840 PRINTTAB(4,16)CHR$129"WHAT IS YOUR
 NAME (max.9)"
 1850 INPUTTAB(9,19);N$
 1860 IFLEN(N$)<10 GOTO1880
 1870 PRINTTAB(12,22)"TOO LONG!":PROCdel
(5):CLS:GOTO1840
 1880 CLS:PL%=9:REPEAT PL%=PL%-1
 1890 UNTIL PL%=1 ORSC%(PL%-1)>SC%
 1900 FORI%=8TO PL%+1 STEP-1
 1910 N$(I%)=N$(I%-1):SC%(I%)=SC%(I%-1)
 1920 NEXT:N$(PL%)=N$:SC%(PL%)=SC%
 1930 PRINTTAB(10,3)CHR$148CHR$157CHR$13
5;"BUSTA BIGHEADS  "CHR$156:PRINT:PRINT
 1940 FORI%=1TO8:PRINT'SPC(8);I%TAB(11)C
HR$133;N$(I%);
 1950 PRINTTAB(23)CHR$134;RIGHT$("000000
"+STR$(SC%(I%)),6):NEXT
 1960 PRINTTAB(11,24)CHR$130"YOU SCORED
";SC%
 1970 PROCdel(200):CLS:*FX15
 1980 PROCin:ENDPROC
 1990 DEFPROCcongrats:VDU26:CLS:SOUND2,7
,4,100:*FX15,1
 2000 VDU4,23,1,0;0;0;0;:PRINTTAB(5,8)"W
ELL DONE"TAB(3,12)"YOU'VE MADE IT"TAB(4,
15)"BUT I BET"TAB(3,18)"YOU'RE FEELING"T
AB(4,21)"ABSOLUTELY"TAB(5,24)"SHATTERED"
 2010 PROCdel(80):PROCend:ENDPROC
 2020 DATA 0,192,1,3,7,161851,211,111421
623921B21,111711A11C11,231711812A11C11,7
11912A12C12,331711A32,511711A41,621,1417
61,110
 2030 DATA832,64,384,384,384,128,832,256
,64,384,64,576
 2040 DATA 0,192,1,3,7,121922C21,151912B
31,313731A32,313611811922B21,213611912B1
2C11,123521813A22C11,113511813922C11,113
511813922C11,331711813A22C11,13152271181
3A22C11,252741
 2050 DATA 64,704,448,384,384,64,64,576,
704,64,256,512
 2060 DATA 448,1024,4,2,3,232613711843C2
2,311413833B22,211512823A32,111511843C12
,823A11B12D12,311823D11,261823C11,811913
C11,811C11,B21,A11
 2070 DATA 832,128,256,320,256,512,64,19
2,64,704,640,640
 2080 DATA 192,384,4,2,3,111213513813B13
,110,110,321641B21,D11,171841,110,231631
A21,232632A22,321631A31,D11
 2090 DATA 64,128,64,576,640,320,768,704
,832,64,832,256
 2100 DATA 480,1024,4,2,3,311511663,3217
53C12,311833B22,311823A12D12,311912C11,3
21C21,311681,311512911,321A11,361B31,111
 2110 DATA128,64,832,128,512,576,640,640
,768,64,64,640
 2120 DATA 384,576,4,2,3,212311911A23,21
2361B21,212311811D13,212311511612811,212
311511612811A11,511612811A11,151612811A2
1C12,811A11,711A11,611911,512811
 2130 DATA 64,64,704,320,192,512,640,640
,128,704,768,384
 2140 DATA 448,1024,5,7,6,411811953,2224
11821A43,222411811B33,222431811C23,22241
1D13,222923,411751,211411721913B11,12143
1B12,121411C11,411
 2150 DATA 64,704,64,64,512,640,448,576,
384,320,384,512
 2160 DATA 512,1024,5,7,6,511811A11C12,2
11312511811A11B22,211312511811A11B22,211
312511811A11B22,211312511811A11C12,21131
2B22,211312B11C12,121312471C12,222512711
911C21,121312C11,C21
 2170 DATA64,448,832,384,512,640,64,576,
```

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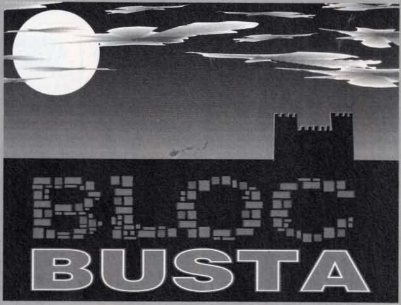

```
704,64,448,448
 2180 DATA 448,1024,5,7,6,111213713D13,4
11713A11,411A11,413511911A13,21151363191
3,211712,311462A11,111411A12D11,411A11,2
31A11,B31
 2190 DATA 640,704,128,224,448,512,832,5
76,512,256,704,640
 2200 DATA 0,320,5,7,6,311711823A32,2123
11422711A32,212311711A32,212711A32,71191
3B22D11,711B22,331711A21,211621A21,21161
1713A11,221611A11D11,110
 2210 DATA 832,64,832,512,256,256,256,64
,832,704,384,448
 2220 DATA 384,1024,2,7,1,133821,1236118
31,113512841,422711C11,422711D11,3114227
11,221422A11D11,161821C11,211B11,311A11,
461
 2230 DATA384,64,128,320,448,576,64,448,
192,576,704,512
 2240 DATA 512,1024,2,7,1,112411621B22,3
12711B22,212311561B22,311492,491,581,211
313611811A11C11,211611,111513611A11D11,6
11821B21,133612
 2250 DATA 832,640,128,320,448,704,832,6
40,384,128,64,512
 2260 DATA 0,384,2,7,1,581,512,313511,51
1,511D11,213571,531B12C11,441911B12C11,3
31911B12C11,331911B12C11,111821
 2270 DATA832,64,512,576,512,128,768,384
,256,704,64,640
 2280 DATA 320,1024,2,7,1,511822A11,4317
32,362,261,181,121352931,211312623822B11
,311911A32,411812941,511812,631
 2290 DATA256,64,640,256,384,512,832,704
,384,64,768,448
 2300 DATA 384,1024,6,7,2,311422A11,3115
22711A11B22,311422A11B22,311522711A11,71
1,711,321612711812A11B12D11,231631A11C22
,110,321631A21,321631A21
 2310 DATA128,64,832,256,448,576,64,640,
704,64,512,384
 2320 DATA 0,320,6,7,2,553,471,312511711
911B12,211C11,211411611811A11C12,1114236
31923D11,113423923,423923,112D12,212C12,
312B12
 2330 DATA256,64,384,640,448,256,128,704
,640,64,64,320
 2340 DATA 0,448,6,7,2,111351921B12D11,1
11321621921C12,A11B12,A11B22,311521811A1
1B22,B22,121A11B22,311521811A12B31,911B3
2,441911A32,110
 2350 DATA768,64,128,576,320,192,448,704
,128,384,832,448
 2360 DATA 576,1024,6,7,2,211413713A23,B
11D12,B11,271B11D12,211811912B11,2115118
11912B11D12,221511811912B11,311511B11,48
1D12,111511711911B11,131
 2370 DATA768,64,64,384,384,704,192,192,
256,448,640,512
 2380 DATA 0,320,1,3,7,212611,112311611C
21,212311611,112311841,212311831,112321C
13D11,212311642B11,112311552C13,21231156
2,311463A11,110
 2390 DATA64,576,640,448,512,128,832,640
,832,64,320,448
 2400 DATA 448,1024,1,3,7,511,521,613711
,413821,B31,713D12,713841C12,451,141D11,
681,110
 2410 DATA768,704,384,384,576,576,64,640
,192,512,128,512
 2420 DEFPROCenv
 2430 ENVELOPE1,1,0,0,-9,0,0,1,126,-1,0,
-3,126,126
 2440 ENVELOPE2,1,10,-30,10,-127,100,5,1
27,-6,-20,-4,126,0
 2450 ENVELOPE3,5,15,0,0,72,0,0,-6,127,0
,-9,0,126
 2460 ENVELOPE4,2,-126,-17,-19,61,76,0,0
,-11,0,-10,107,120
 2470 ENVELOPE5,1,-2,0,0,4,0,0,0,0,0,-12
7,126,0
 2480 ENVELOPE6,1,0,0,0,0,0,0,126,-1,-3,
-126,126,0
 2490 ENVELOPE7,6,6,1,0,255,0,0,126,0,0,
-126,126,126
 2500 ENVELOPE8,2,127,0,0,126,0,0,126,0,
0,-126,0,126
 2510 ENDPROC
 2520 DEFPROCchars
 2530 VDU23,224,&FE7E;&FEFE;&FEFE;&FEFE;
 2540 VDU23,225,&FEFE;&FEFE;&FEFE;&FC;
 2550 VDU23,226,&200;&E2C2;&9AB2;&868E;
 2560 VDU23,227,&200;&DEFE;&FEFE;&FEFA;
 2570 VDU23,228,0;&40;&800;0;
 2580 VDU23,229,&1010;0;0;0;
 2590 VDU23,230,&7EFF;&1818;0;&3C18;
 2600 VDU23,231,0;&E724;&3C7E;0;
 2610 VDU23,232,&FF7E;&3CFF;&FF7E;&2466;
 2620 VDU23,237,&2800;&44;&8282;0;
 2630 VDU23,238,0;&3010;&7070;&7070;
 2640 VDU23,239,&8282;0;&8282;0;
 2650 VDU23,240,&7070;&7070;&6070;&40;
 2660 VDU23,243,&8199;&C324;&4410;&6C44;
 2670 VDU23,244,&2442;&5A18;&1881;&9966;
 2680 VDU23,245,&ADE;&EAFA;&A0EE;&A0;
 2690 VDU23,246,&3C24;&1800;&2442;&4224;
 2700 VDU23,247,&1800;&42;&2418;0;
 2710 VDU23,248,&FAFE;&EEF6;&BEDE;&FEFE;
 2720 VDU23,249,&6470;&1C4C;&704C;0;
 2730 VDU23,250,&8282;&C682;&C6C6;&6CEE;
 2740 VDU23,251,&2828;&1010;&7C10;&1038;
 2750 VDU23,252,&10;0;0;0;
 2760 VDU23,253,&7E01;&241;&420;&4842;
 2770 VDU23,254,&220;&2244;&3484;&FF6E;
 2780 VDU23,255,-1;-1;-1;-1;
 2790 ENDPROC
```

Get it right ✓

```
  10 =    0 0    320 = ECAC 6    640 = AF95 6    960 = ED0F 6   1280 = 8497 1   1600 = 612F 4   1920 = 90EB 9
  20 =    0 0    330 = 6B7F 8    650 = 37DB 7    970 = 9CA8 0   1290 = 4F83 1   1610 = 9424 C   1930 = 1AD8 B
  30 =    0 0    340 = F03F 3    660 = ED0F 6    980 = EF6D 0   1300 = ED0F 3   1620 = 8893 F   1940 = E42A 7
  40 = B7CD D    350 = 9972 5    670 = 9DAE E    990 = CDB3 4   1310 = FBEB D   1630 = B91F 6   1950 = F445 3
  50 = 277D 3    360 = B69A 5    680 = 12FD 3   1000 = 1050 F   1320 = F184 5   1640 = 6684 1   1960 = C015 7   2240 = F6FB D   2520 = 1613 0
  60 = EEB9 5    370 = 4347 B    690 = B6E9 1   1010 = 4C83 3   1330 =  95E D   1650 = 6E17 8   1970 = 7951 A   2250 = F86B 7   2530 = E066 C
  70 = 38E4 7    380 =  2BD F    700 = BED1 B   1020 = E480 4   1340 = A1E5 0   1660 = 7189 C   1980 = 564B F   2260 = 78F1 2   2540 = 2DC6 9
  80 = 2C6F A    390 = F735 5    710 = 7C50 7   1030 = 575B 3   1350 = 7C56 6   1670 = D52A C   1990 = 1E3F D   2270 = 4AF2 4   2550 = 8ADE 5
  90 = 9ABE A    400 =  A37 A    720 = 20A8 9   1040 = 3638 9   1360 = 3F75 C   1680 = CBA8 5   2000 = B00F 7   2280 = 2D14 C   2560 = 19CB E
 100 = 57C0 C    410 =  631 7    730 = 9E49 5   1050 = C1BB E   1370 = 3E84 4   1690 = 167E 7   2010 = 31E2 5   2290 = 4D4D A   2570 = 8677 6
 110 = A8DF 5    420 = B219 4    740 = DDBC 0   1060 = 84F7 9   1380 = ED0F 4   1700 = 33D2 E   2020 = 403D 8   2300 = D7BE 5   2580 = 94E4 D
 120 =  237 8    430 = 2AD0 4    750 =  1DC E   1070 = 3B4F A   1390 = A058 F   1710 = 37C4 8   2030 = FD6D A   2310 = 4DC3 B   2590 = 44A8 5
 121 = 6899 7    440 = 837A E    760 = 2535 6   1080 = 45D9 0   1400 = 32B3 7   1720 = 6E17 1   2040 = ED2B B   2320 = 2920 9   2600 = EBEF 6
 130 = A68F 1    450 =   74 A    770 = 6296 6   1090 = 57B6 0   1410 =  565 7   1730 = C3BA 8   2050 = E76C 6   2330 = 9CFA 3   2610 =  A4C 2
 140 = 65CC 7    460 = 1816 7    780 = 2F03 7   1100 = 1A8B 7   1420 = ED0F 7   1740 = 30FB 1   2060 = 67D4 0   2340 = 7F55 6   2620 = 8257 A
 150 = BFBA 5    470 = 4534 9    790 = ED0F 8   1110 = 824F C   1430 = 2BC3 4   1750 = AA92 6   2070 = E628 9   2350 = 98E2 8   2630 = 5E5E D
 160 = 3FEC 3    480 = 9765 F    800 = 13AC 9   1120 = ED0F 4   1440 = 7D5C B   1760 = 9A5C E   2080 = 3DF4 0   2360 = 45DB 2   2640 = EF3F A
 170 = 7983 1    490 = BFBD E    810 = 1082 0   1130 = D916 C   1450 =  8D0 4   1770 = ED0F 9   2090 = CE88 5   2370 = F4D2 C   2650 = DB24 3
 180 = D519 A    500 = 2EBF A    820 = ED0F 7   1140 = A336 9   1460 =  FC4 6   1780 = E0F5 6   2100 = 5324 8   2380 = 9A41 F   2660 = 1D15 E
 190 = 5751 B    510 =  6C5 E    830 = 6C0A 8   1150 = A177 4   1470 = 16AF 6   1790 = 5D4E 5   2110 = 85A5 6   2390 = AE17 3   2670 = 2617 B
 200 = DF20 E    520 = 3B1C E    840 = 4C14 A   1160 = ED0F 8   1480 = FEAC 0   1800 = 4024 C   2120 = F1D4 4   2400 = 85A4 A   2680 = B635 2
 210 = 13A8 A    530 = ED0F A    850 = ED0F 1   1170 = 3F2A 5   1490 = 778F 8   1810 = 186F 9   2130 = 56C2 A   2410 = BE45 C   2690 = 4815 7
 220 = 206D 1    540 = B4E4 B    860 = 2AFD 9   1180 = F4B9 3   1500 =  EE3 4   1820 = A26B 6   2140 = A1A7 2   2420 = 2252 D   2700 = 7736 5
 230 = D777 A    550 =  157 5    870 = 6B1E F   1190 = 933A A   1510 = 93C5 E   1830 = D04D 1   2150 = D2A6 0   2430 = 3AC1 E   2710 = 8CCC 7
 240 = C871 1    560 = 4166 9    880 =  92E C   1200 = 55EC E   1520 = E454 A   1840 = FBD8 9   2160 = F85D B   2440 = 979E 7   2720 = 8B7B 0
 250 = E4ED 3    570 = 199B 1    890 = 7222 3   1210 = DA04 1   1530 = 9591 9   1850 = E3FC C   2170 = AC78 0   2450 = C631 B   2730 = 508C 7
 260 = 9925 9    580 = FB5D 0    900 = D529 F   1220 = 5148 F   1540 = E4B5 E   1860 = 63DC 3   2180 = 5A29 6   2460 =  C7F 7   2740 = 7D37 6
 270 = A68C 4    590 = D0A6 C    910 = D174 F   1230 = ED0F F   1550 =  A8E 4   1870 = F8B5 9   2190 = 2A31 7   2470 = 3952 2   2750 = C2B3 C
 280 = D1B9 2    600 = 60F7 4    920 = 266E 4   1240 = 8FAB 1   1560 = E5AD D   1880 = 43B5 0   2200 = E0A9 B   2480 = B0D4 A   2760 = 60CD 4
 290 =  AFF B    610 = 2C28 1    930 =  782 5   1250 = 4800 C   1570 = 374B 7   1890 = 2043 B   2210 = ED73 5   2490 = 646D 5   2770 = 3DEF 9
 300 = D01A 9    620 = 6E86 7    940 = ED0F F   1260 = ED0F 5   1580 = ED0F 3   1900 = 12BC A   2220 = 7456 8   2500 = 367B B   2780 = 70B7 2
 310 = 3500 5    630 = 3E65 4    950 = F37D A   1270 = 173A 9   1590 = C57C E   1910 = F9A6 7   2230 = 9168 6   2510 = ED0F 1   2790 = ED0F 9
```

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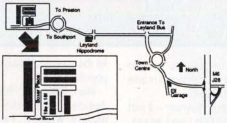

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A BRIGHT NEW LOOK

Take a conducted tour with Hac Man round our revamped Software Scene

THE format of Software Scene in *The Micro User* has been more or less constant for a few years now, apart from a few cosmetic changes and a switch away from photographed screens.

The game statistics at the end haven't changed since April 1986, but the games world certainly has moved on in five years. So for the 100th issue we're completely revamping our system:

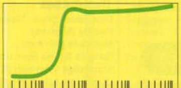
From now on there'll be just two statistics. The first is **Presentation** which covers sound, graphics and usability all in one. Instead of having these as individual values, Presentation is there to show the overall impression that a game gives, on a scale of 1 to 100.

For example, a glossy shoot'em up like Red Shift or Nevryon with excellent graphics, music and easy to control would rate at perhaps 85. A chess program doesn't need music, but if it has good quality graphics and a friendly user interface it could score 85 or more too.

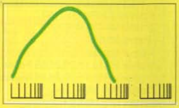
A type-in magazine game might have lower quality graphics, only a little sound but minimal control keys so it might rate only 40.

The second statistic incorporates both playability and value for money, while providing a much more useful analysis of the game: The Interest curve.

If you take Elite, it's quite a tricky game to get into, mainly because docking is initially so hard. But once you've cracked that you can proceed quite quickly. The Mad Hatter's Elite column proves that this game in particular will hold your interest for a very long time – years in some case. So it has an interest curve like this:



Most shoot'em ups are easy to get into but don't have lasting appeal, so they'll rate interest curves like this:



The vertical scale relates to how much of your attention might be taken by the game, on a scale of 0 (none) to 100 (totally).

The horizontal scale is time, and is *logarithmic*, it's not intended to be very precise, but the divisions nearer the left represent short time periods – minutes and hours – while those to the right spread out into months and years.

● And that's all there is to it, so from your round, green hacking friend: Here's to another 100 issues!

THE REALM

Graeme Richardson tells how he became a games writer for the Acorn world

IN May 1989 a bored 16-year-old sat looking at his BBC Master 128 wishing there were some really good arcade games for it. He thought about the arcades and the infamous R-Type. He thought about similar ones on the Commodore 64 – he could program a little – and decided to do something about it.

Within a couple of months it was nearly finished, but then it was placed in the disc box and forgotten. Come October, bored of A levels and the delights of his new A3000, the programmer rigged up his old faithful Beeb and that disc slipped back into the drive.

It had a name now, BATL, and prompted by his friends he sent it off to a few companies in an attempt to earn some cash. One software company, the Fourth Dimension, wrote back immediately – they liked it.

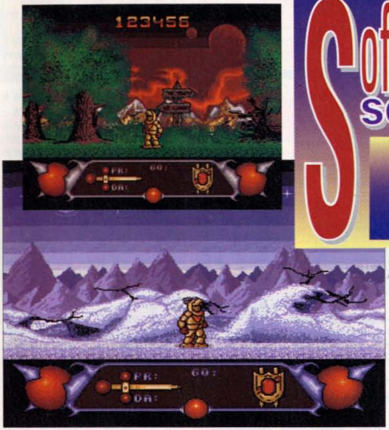
This is how it all started for me, back in '89, and I was quite shocked to find anyone liked this rather obscure product – itself a protest against the lack of decent arcade games for the BBC Micro.

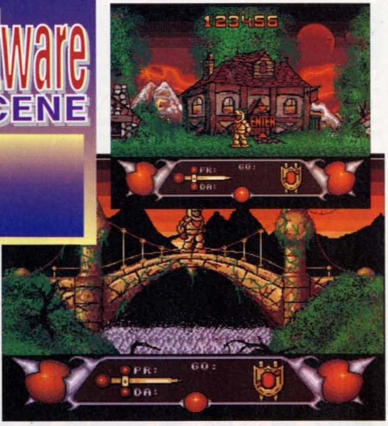
The name became *Nevryon* – it just came to me once when I was asleep. The Options screen, touches here and there like skill levels and a volume control were added and then it hit the shelves. There it is now – quite popular too.

Mark Botterill at Fourth Dimension decided before the launch that I should write a version for the Archimedes. I thought it would be a good idea: A straight conversion with better graphics and sound. Maybe it could have some of that fancy parallax scrolling.

But it's not a straight conversion. While keeping the same idea in mind of flying over a variety of landscapes shooting absolutely everything in sight, it changed a lot.

The backgrounds are much more





OF NEVRYON

detailed and interactive, the screen is large, and it's fast and varied.

The BBC Micro version gives the impression of bombing along causing violent havoc throughout. But the Archimedes one seems like high-tech tactical warfare.

The BBC Micro was being pushed very hard for Nevryon, but the Archimedes is just ticking over.

While writing the Arc version, the main thought in my mind was to produce a game that would rival those on the Amiga – and that's not easy.

Everything has to be very carefully designed and produced at the highest possible standard. Nothing could be left to chance, nothing could be overlooked.

Apart from the fancy presentation, Amiga games are also rather stylish and give an air of effortless speed as if the computer is just ticking over when 30-plus aliens appear.

Nevryon also had to have this relaxed look throughout and the same turn of speed. In fact it manages to fit quite a lot on screen at once – about 80 sprites simultaneously at 25 frames per second and, usually, parallax scrolling.

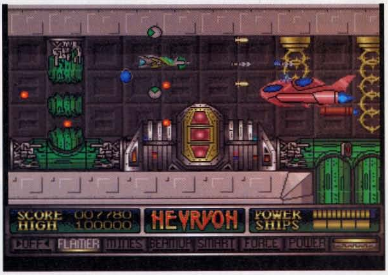
SCORE
HIGH
NEVRYON
POWER
SHIPS

The Archimedes was not quite powerful enough to manage 50 frames a second, which is the ultimate in smooth animation. Some games on the Amiga do manage it, but they don't have 256 colour graphics, real stereo sound and there's not very much on screen.

If Nevryon had been written in a 16 colour mode 50 frames a second animation would have been possible.

How Nevryon manages to keep up its speed is due to the methods used. Basically there are two ways to write a routine:

It can be one complex multi-purpose routine that does everything but not quickly. For example, a sprite routine that can handle any size and flip the sprites horizontally and vertically in the same piece of code.



Or you can have many simple routines each doing one thing. Using the sprite routine example, a routine to plot the sprite one way, another to plot it flipped vertically and so on.

This second method means more code is required but the speed advantage is dramatic. Nevryon was written in this way and had about 20 separate sprite routines, each of which plotted sprites in slightly different ways.

This programming method can be extended to many other parts of the program. The scrolling was another case. On Nevryon the entire screen is replotted every frame and the part which plots the backdrop – 60k of data – has to be very fast.

Although playability is foremost –

➤

Software SCENE

83%

BLOWPIPE

...a shot in the arm

HORIZONTALLY scrolling shoot'em ups aren't exactly common on the Archimedes or BBC A3000, unlike certain other machines which are inundated with them. But the ones that arrive for the Arc are invariably good, and Blowpipe is no exception.

The package consists of the manual plus two discs – although the only disc swapping required is right at the start. Only disc two is needed while playing.

Running Blowpipe from the DeskTop results in a nice title sequence just like you get in the movies complete with vertically scrolling text message on a moving starfield.

Pressing the spacebar at any point takes you on to the control screen to select between keyboard and joystick control.

The keys you use can also be redefined with a minimum of difficulty and music and sound effects can be switched on and off independently.

There are five levels to get through, consisting of a variety of landscapes and little nasties flying around in complex and irritating formation. Your ship's laser has auto-fire if you hold the appropriate key down, but you get a more effective stream of pulses by keyboard battering.

Price: £19.95
Supplier: The Serial Port,Burcott
Manor, Wells, Somerset BA5 1NH.
Tel: 0243 531194

At the end of levels two to five lurk the obligatory giant monsters which need to be disposed of. Unfortunately I just couldn't handle the first one despite all efforts, and had to resort to the cheat mode in my special review version to get the pictures of the other levels shown here.

Like all good blast'ems of this type you can improve the kill capacity of your ship. In Nevryon this occurs as you go along, but in Blowpipe you have to pick up blue floating bubbles that appear each time you notch up a number of kills.

At the end of the level these go to make up a number of points you can spend on upgrades – double fire lasers, rockets launching in various directions, defense balls, re-powering your machine, smart bombs and so on.

In the higher levels it's essential to have a good selection of these extra items otherwise you won't survive very long.

Interesting feature in Blowpipe is that the background features – though not active in the same way as Nevryon's – make their presence felt. Rather than the obvious power draining effect that is usually used, you simply can't fly across the terrain. This means you can get caught between surface features and the edge of the screen with terminal effects.

On levels three to five this is used to put barriers all the way across the screen and create maze-like features through which you have to choose the right path.

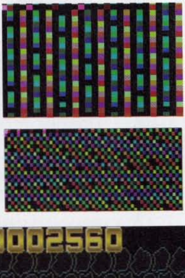
The game isn't perfect. There is a high score table, but it isn't saved– which I object to – I want people to know how wonderful I am. And there's no volume control on the sound.

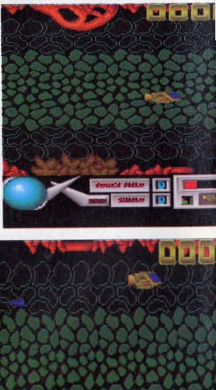
Overall the graphics are effective though not stunning. The music, on the other hand, is fantastic. There are 14 separate, original tunes all of which are excellently rendered using the ubiquitous !Tracker software –

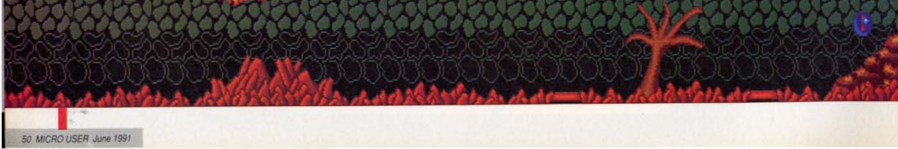
lets party

please wait

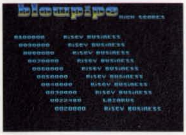
game over







FORCE FIELD
SHIELD
SMART BOMB


blowpipe HIGH SCORES

```
0100000    RISKY BUSINESS
0090000    RISKY BUSINESS
0080000    RISKY BUSINESS
0070000    RISKY BUSINESS
0060000    RISKY BUSINESS
0050000    RISKY BUSINESS
0040000    RISKY BUSINESS
0030000    RISKY BUSINESS
0022400    LAZARUS
0020000    RISKY BUSINESS
```

EDGE PRESENTS

blowpipe

also from the Serial Port. Not only do they use good and varied samples but the style of each piece is quite different showing decent talent was at work.

Nice one, guys.

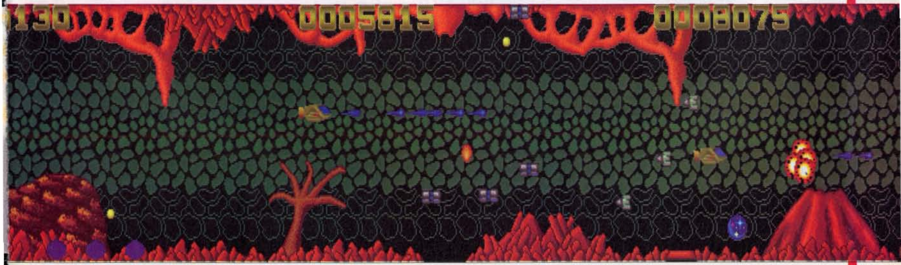
Lazarus

blowpipe OPTIONS

F1 F2 F3

F4 F5 F6

press space


0005815
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or should be – the graphics are also very important. Apart from their speed, they have to look effective and able to grab and hold your attention.

On the Amiga graphics are becoming an art form in their own right: Shadow of the Beast and Xenon II really demonstrate the machine's potential for high quality graphics. The Archimedes is almost identical in the graphics department – some things it can do better and some things it can't. They're pretty evenly matched.

When it comes to 3D graphics such as those in Chocks Away, Apocalypse, Powerband and Interdictor, the Archimedes leaves the Amiga for dead. But sprites are a different matter as the Amiga has hardware specially designed to handle them.

In Nevryon I was trying to produce graphics as good as those on the Amiga, which are usually of almost arcade quality. Perhaps I wasn't successful but I used every bit of video trickery I could think of to get them to look as they do.

With the exception of stages one and two which are completely different to the rest, all the backdrops were designed on Minerva's Atelier art program.

All of the end-of-stage nasties and some of the larger aliens were also produced on Atelier. Most of the rest were produced with !Paint and some were digitised, such as the asteroids on stages three and four and the very large golden mask on stage five.

Digitising was by the Gordon Key, author of Powerband, Apocalypse, Holed Out and E-Type.

Gordon helped rather a lot during the creation of Nevryon and came up with a lot of good ideas. I also received a lot of help from Peter Gillett who, apart from creating the impressive music and sound, helped me out on the coding side in some cases. The Archimedes is the only computer that can, as standard, create true stereo sound. The Amiga also has stereo sound but it's either full left or full right.

The seven position stereo of the Archimedes enabled Peter and I to create a sort of live effect where the position of a sound is related to the position of its source on screen.

The music is also very compelling and only shuts up when a new piece is being loaded so there's a virtually continuous soundtrack. This helps create the necessary atmosphere and makes play seem faster.

That just about wraps it up for Nevryon. I'm now working on something new so here's a sneak preview:

It's called **Enter the Realm** and is set in a mythical land where generally anything can happen and usually does. You play the part of a knight who must defeat evil by running around killing things – but there's a lot more to it than that.

It runs in 16 colours and I have taken advantage of this to the full. The frame rate is 50 per second, which is very smooth – any faster and your eyes would not notice the difference anyway.

It features total parallax scrolling of the whole playing area which looks far superior to Nevryon and creates a lot of visual depth. The animation is vastly better too, and the sound will differ greatly. Instead of music throughout, sound will be used to emphasise the current background. A thunderstorm and rain and the sound of running water are just two such cases.

Between the action sequences I intend to use the Archie's graphics to the full to display a series of still pictures to enhance the atmosphere. These will probably be painted by a friend of mine, Ruth, on paper and then colour digitised into a form which the computer can display. The effect should be quite interesting.

Enter the Realm will probably be out by September. Watch this space.

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Bridging the PC-Acorn gap

Terry Blunt looks at a new book for BBC Micro and PC users

As the BBC range of micros tends to straddle the business/home fence rather uncomfortably there are a lot of people who come into contact with both the Acorn machines and the PC or its clones.

This can cause problems, as there are just enough common points in the two different systems to cause the unwary to use the wrong commands, with potentially disastrous results.

Acorn to PC is a new book from Watford Electronics intended to make the transition from the Acorn range of micros to the PC and compatibles a little more comfortable.

The book, at 260 pages, can also be used in the reverse sense to help PC users to become familiar with the Acorn micros. The author writes from his own experience of using both systems – he apparently has a BBC B for domestic use and a PC for business purposes.

Each chapter covers a different area, with immediate comparisons between the two systems. This coverage extends to the hardware itself and the operating systems.

The point is made that it is difficult to consider the PC operating system as a separate entity from Dos (disc operating system) itself. Acorn users, on the other hand, will be quite familiar with the idea of plug-in filing systems.

MSdos is described in detail, as are the Acorn DFS and ADFS, but unfortunately the extensions available in the Archimedes version of the ADFS aren't mentioned at all. This is an important omission, particularly as the author makes value comparisions in the last chapter.

Quite a number of the benefits of MSdos over the older Acorn filing systems are either lost, or become irrelevant when you use the DeskTop filer.

The book is fairly easy to follow, with a 15 page index and extensive appendices, the most interesting parts of which are a comprehensive list of Acorn filing system commands and an even fuller list of MSdos commands and terms.

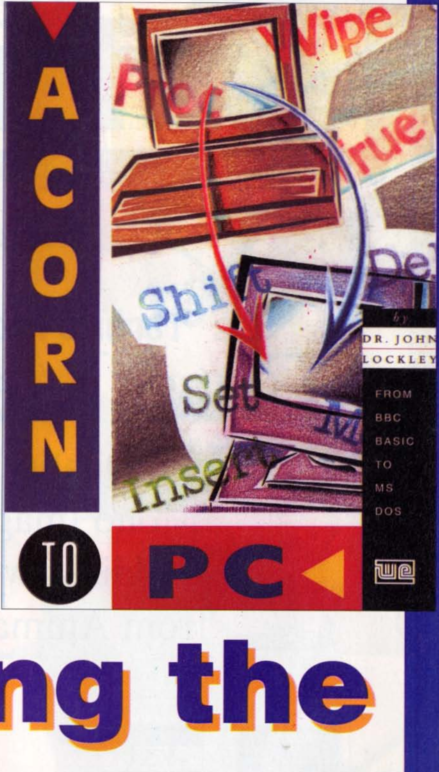
However, there is quite a lot of repetition in the book. This may be beneficial when you want to dip into one particular topic and may need reminders. Yet there are also some inconsistencies, particularly over the use of the terms Default and Current when referring to disc directories.

The author describes many features that appear in both Acorn and PC environments, although some are found only in the latter. There is a particularly interesting section on redirection that includes piping and filters.

These are concepts that will be completely new to most Acorn people, though a form of redirection is available on the Archimedes.

Summing up

It's difficult to decide about this book. It contains considerable useful information, but I found the Default/Current argument a trifle irritating. Also I think more attention should have been paid to the Archimedes.



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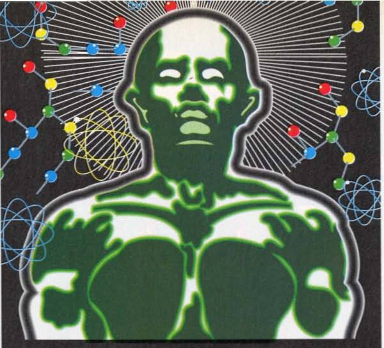


The Beeb Body Building Course

Filling the bus

Mike Cook climbs aboard Part 2 of the I²C bus adventure

WE looked last month at how to extract the I²C bus connector from your Archimedes or A3000. We have still to see how to use it with the older Acorn machines, but first I would like to turn my attention to actually building something using the bus.

A look through the data booklets shows a number of interesting devices, but perhaps the most immediately obvious are the digital and analogue interface chips, PCF8591 and PCF8574.

The PCF8574 is an 8-bit digital input output device and, as such, is very much like a user port. It differs, however, in the lack of control lines, but fortunately these are not used very much.

Another vital difference is that where each bit on the user port can be programmed to be an input or an output, the PCF8574 has genuine bidirectional data lines – there is no need to program a data direction register.

The PCF8591, on the other hand, is basically an 8 bit device with four analogue inputs and one analogue output. Some clever circuit trickery allows its single D/A converter to appear to perform all these functions simultaneously.

However, the really clever part is that the inputs can be used as either conventional single-ended inputs or grouped to give differential inputs.

This gives it the ability to measure voltages, not just relative to earth, but with reference to any voltage point. This allows us to measure the voltage across a resistor to determine current, as we shall see next month. Each of these devices requires a unique address on the I²C bus. A bus address is a 7 bit number, part of which is built into the device and the rest is taken from external pins. This is shown in Figure I. Notice that the read/write bit gives the eighth bit giving a unique read and write address.

Given the device address, the bus clock and data lines, remarkably little else is needed to make a fully-fledged interface board. My circuit is shown in Figure II and represents just about a minimum configuration. You could get fancy by adding buffered outputs or relay drivers, but that only adds to the cost and reduces flexibility. The only concession to buffering is an optional buffer for the analogue output.

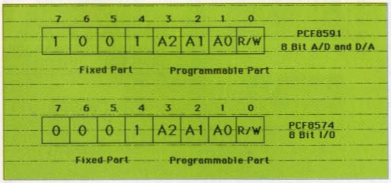
According to the data sheets, unused analogue inputs must be earthed so you will see a select link on each input. This is simply three pins and a shorting link – the type that is scattered about inside the computer – and allows you to earth the channels currently not being used.

Similarly there are links on the device address lines. Fitting a shorting link gives a logic 0, removing it a logic 1. There is a link for the reference voltage of the converters as well, allowing a choice of either an external voltage or the boards 5 volts.

The pin numbers of the I2C bus refer to the connectors on the printed circuit board, which together with all the other components is available as Body Build Pack No. 74.

Having built the device, we need some software to drive it: Basically the Archimedes offers a single call to

➤



7	6	5	4	3	2	1	0	
1	0	0	1	A2	A1	A0	R/W	**PCF8591** **8 Bit A/D and D/A**
Fixed Part				Programmable Part				

7	6	5	4	3	2	1	0	
0	0	0	1	A2	A1	A0	R/W	**PCF8574** **8 Bit I/O**
Fixed Part				Programmable Part				

Figure I: The addressing of Bus Devices

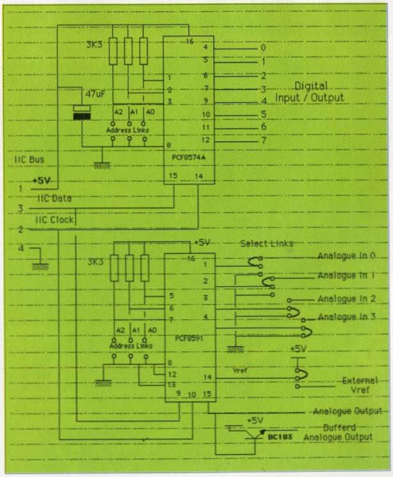


Figure II: The IIC board

deal with the I2C bus: IIC_Control which is SWI &240. This is given the device address, a pointer to a data block and the length of the block. Remember, the least significant bit of the address is the read/write line.

When the SWI call returns, the buffer's contents will have been either sent to the I2C device or filled by it depending on whether you were reading or writing.

This means that you can rapidly read or write several values with a single command. For example, you could fill up a block of memory with a sequence of numbers and output them all in one go. This is useful for waveform generation or fast data gathering.

The PCF8574 is simple to operate – you just read it or write to it. Make sure that if you are using it as an input you first write logic 1s to it. The PCF8591, on the other hand, is much more complex as it contains a control register, where the first byte to be written to the device ends up.

Subsequent bytes are acted upon according to the contents of this control byte. We will consider these in more detail next month, but just to get you started here are four programs that illustrate reading and writing each device.

They assume all address links are made giving a logic zero. When illustrating writing to a device the programs put out an increasing binary count giving a ramp on the analogue output or a series of differing frequency square waves on the digital device. The reading programs show the result in hex for the digital input or each four of the analogue inputs.

● *Next month we will see how our interface board can be used to make a Transistor Curve Tracer, useful in seeing whether transistors work, or matching their characteristics for amplifiers.*

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```
   10 REM> IIC1
   20 PRINT "Write a ramp to the
Analogue Output"
   30 PRINT "By Mike Cook"
   40 DIM PBK% 3
   50 ?PBK%=&40
   60 REPEAT
   70 FOR A%=0 TO 255
   80 PBK%?1=A%
   90 SYS "IIC_Control",&90,PBK%,2
  100 NEXT
  110 UNTIL FALSE
```

```
 10 =    0 0  |   70 = 2BF8 8
 20 = A5AA A  |   80 = 6B1F D
 30 = 2B2D 4  |   90 = 99E0 E
 40 = FE1E 6  |  100 = 2C83 A
 50 = 4667 8  |  110 = 226C F
 60 = BFBA E  |
```

Get it right ✓

```
   10 REM> IIC2
   20 CLS
   30 PRINT "Read the Analogue input
s"
   40 PRINT "By Mike Cook"
   50 DIM PBK% 5, PBS% 4
   60 ?PBS%=&4
   70 REM Set up the control register
   80 SYS "IIC_Control",&90,PBS%,1
   90 PRINT TAB(8,10);"IN 3";SPC(6);"
IN0";SPC(6);"IN 1";SPC(6);"IN 2"
  100 REPEAT
  110 PRINT TAB(0,12)
  120 SYS "IIC_Control",&91,PBK%,4
  130 PRINT ~PBK%?0,~PBK%?1,~PBK%?2,
~PBK%?3
  140 UNTIL FALSE
```

```
 10 =    0 0  |   80 = 37E7 D
 20 = 7A16 6  |   90 =  912 6
 30 = 791E D  |  100 = BFBA 2
 40 = 2B2D 3  |  110 = 6631 6
 50 = 5E51 0  |  120 = BEF5 B
 60 = B951 3  |  130 = 3B66 1
 70 =    0 3  |  140 = 226C A
```

Get it right ✓

```
   10 REM> IIC3
   20 PRINT"IIC BUS OUTPUT"
   30 PRINT"Binary Count to device at
&70"
   40 PRINT"By Mike Cook"
   50 DIM PBK% 3
   60 REPEAT
   70 FOR A%=0 TO 255
   80 ?PBK%=A%
   90 SYS "IIC_Control",&70,PBK%,1
  100 NEXT
  110 UNTIL FALSE
```

```
 10 =    0 0  |   70 = 2BF8 8
 20 = 3B2B B  |   80 = 2F8B 2
 30 = BB98 8  |   90 = DAF4 5
 40 = FC23 B  |  100 = 2C83 E
 50 = FE1E B  |  110 = 226C F
 60 = BFBA D  |
```

Get it right ✓

```
   10 REM> IIC4
   20 CLS
   30 PRINT"IIC Bus Digital Input Dev
ice &70"
   40 PRINT"By Mike Cook"
   50 DIM PBK% 3
   60 REM SET ALL BITS HIGH
   70 ?PBK%=&FF
   80 SYS "IIC_Control",&70,PBK%,1
   90 REPEAT
  100 SYS "IIC_Control",&71,PBK%,1
  110 PRINT TAB(0,5)~?PBK%;" HEX ";SP
C(3)
  120 UNTIL FALSE
```

```
 10 =    0 0  |   70 = 360D D
 20 = 7A16 6  |   80 = DAF4 A
 30 = EE60 7  |   90 = BFBA 9
 40 = FC23 9  |  100 = 9D27 4
 50 = FE1E 2  |  110 = 6DA8 D
 60 =    0 2  |  120 = 226C 4
```

Get it right ✓

Routine MATTERS

Number converter

Author: K.P.Parker
Language: Basic
Filename: DBHcvrt

BEING able to convert quickly between decimal, binary and hexadecimal numbers is very useful. For example, in assembly language programs addresses and values are usually represented in hex format, but it can be handy to know their decimal equivalents.

And when defining a character shape with VDU 23 it is essential to know either the decimal or hex value that represents the desired binary pattern.

This program allows the conversion of any of the mentioned formats to the other two. All inputs are fully error trapped for ease of use, and any number up to 65535 in decimal (&FFFF in hex/16-bit in binary) can be converted.

Lines 70 to 110 perform the conversion from decimal to hex and binary, 120 to 180 from binary and 190 through 260 from hex. Several procedures are also tagged on to the end of the program which contribute towards the screen display and conversion of decimal to binary.

```
   10 REM Decimal/Hex/Binary Converter
   20 REM by K.P.Parker
   30 REM (c) The Micro User
   40 MODE 7:PRINT TAB(3,2)CHR$(141)CHR$
(134)"DECIMAL/HEX/BINARY CONVERSIONS"'TA
B(3,3)CHR$(141)CHR$(134)"DECIMAL/HEX/BIN
ARY CONVERSIONS"'TAB(4,4)CHR$(134)STRING
$(30,"_")
   50 PRINT TAB(7,8)CHR$(131)"1) DECIMAL
 to Hex/Binary"'TAB(7,10)CHR$(131)"2) BI
NARY to Hex/Decimal"'TAB(7,12)CHR$(131)"
3) HEX to Decimal/Binary"'TAB(6,6)"Selec
t Convertion Required:-";
   60 N=GET:ON VALCHR$(N) GOTO 70,120,19
0 ELSE 60
   70 CLS:PRINT TAB(3,4)CHR$(134)"DECIMA
L to HEX/BINARY CONVERSION"'TAB(3,5)CHR$
(134)STRING$(32,"_")
   80 N=0:PROCblank1:PROCheadings:INPUT
LINE TAB(4,7)"Enter Decimal Number "N$:L
=LEN(N$):PROCblank2
   90 N=VAL(N$):IF N>65535 PRINT TAB(8,1
0)CHR$(129)CHR$(136)"TOO LARGE! TRY AGAI
N":GOTO 80 ELSE IF ASCMID$(N$,1,1)=45 PR
INT TAB(8,10)CHR$(129)CHR$(136)"TOO SMAL
L! TRY AGAIN":GOTO 80
  100 X=0:FOR J=1 TO L:IF ASCMID$(N$,J,1
)<48 OR ASCMID$(N$,J,1)>57 PROCincorrect
  110 NEXT:IF X=1 GOTO 80 ELSE PRINT TAB
(2,14);N;TAB(11,14);~N:PROCdec_bin:PROCo
ption:IF X$="Y":GOTO 80 ELSE 40
  120 CLS:PRINT TAB(3,4)CHR$(134)"BINARY
 to DECIMAL/HEX CONVERSION"'TAB(3,5)CHR$
(134)STRING$(32,"_")
  130 Dectotal=0:PROCblank1:PROCheadings
:INPUT LINE TAB(4,7)"Enter Binary Number
 "Bin$:PROCblank2:L=LEN(Bin$)
  140 X=0:FOR J=1 TO L:IF ASCMID$(Bin$,J
,1)<48 OR ASCMID$(Bin$,J,1)>49 PROCincor
rect:NEXT:IF X=1 GOTO 130 ELSE NEXT:IF X
=1 GOTO 130
  150 IF L>16 PRINT TAB(8,10)CHR$(129)CH
R$(136)"TOO LARGE!_TRY AGAIN":GOTO 130
  160 IF L<=8 PRINT TAB(38-L,14)Bin$TAB(
19,14)STRING$(8,"0")TAB(30,14)STRING$(8-
L,"0") ELSE IF L>8 PRINT TAB(30,14);RIGH
T$(Bin$,8)TAB(35-L,14);LEFT$(Bin$,L-8)TA
B(19,14)STRING$(16-L,"0")
  170 FOR N=1 TO L:Bit$=MID$(Bin$,N,1):B
itval=VAL(MID$(Bin$,N,1))*2^(L-N):Dectot
al=Dectotal+Bitval:NEXT
  180 PRINT TAB(2,14);Dectotal;TAB(11,14
)~Dectotal:VDU 7:PROCoption:IF X$="Y":GO
TO 130 ELSE 40
  190 CLS:PRINT TAB(2,4)CHR$(134)"HEX to
 BINARY/DECIMAL CONVERSION"'TAB(2,5)CHR$
(134)STRING$(32,"_")
  200 N=0:PROCblank1:PROCheadings:INPUT
LINE TAB(6,7)"Enter Hex Number &"Hex$:L=
LEN(Hex$):PROCblank2
  210 FOR J=1 TO L:X=0:IF ASCMID$(Hex$,J
,1)<48 OR ASCMID$(Hex$,J,1)>70 GOTO 230
ELSE 240
  220 IF ASCMID$(Hex$,J,1)>57 OR ASCMID$
(Hex$,J,1)<65 GOTO 230 ELSE 240
  230 PROCincorrect
  240 NEXT:IF X=1 GOTO 200 ELSE N=EVAL("
&"+Hex$)
  250 IF N>65535 PRINT TAB(7,10)CHR$(129
)CHR$(136)"TOO LARGE! TRY AGAIN":GOTO 20
0 ELSE IF N<1 PRINT TAB(7,10)CHR$(129)CH
R$(136)"TOO SMALL! TRY AGAIN":GOTO 200
  260 PRINT TAB(2,14);N;TAB(11,14)Hex$:P
ROCdec_bin:PROCoption:IF X$="Y":GOTO 200
 ELSE 40
  270 DEF PROCheadings:PRINT TAB(1,12)CH
R$(131)"Decimal"TAB(11,12)"Hex"TAB(19,12
)"High Byte  Low Byte":ENDPROC
  280 DEF PROCdec_bin:FOR X=1 TO 16:R=N
MOD 2:D=N DIV 2:R$=STR$(R):N=D:IF X<=8 P
RINT TAB(38-X,14);R$TAB(27,14)" " ELSE I
F X>8 PRINT TAB(35-X,14)R$
  290 NEXT:VDU7:ENDPROC
  300 DEF PROCblank1
  310 PRINT TAB(0,14)STRING$(40," ")TAB(
0,20)STRING$(40," "):ENDPROC
  320 DEF PROCblank2
  330 PRINT TAB(24,7)STRING$(40," ")TAB(
0,10)STRING$(40," "):ENDPROC
  340 DEF PROCincorrect:PRINT TAB(5,10)C
HR$(129)CHR$(136)"INCORRECT ENTRY! TRY A
GAIN":J=L:X=1:ENDPROC
  350 DEF PROCoption:PRINT TAB(3,20)CHR$
(131)"Another Entry/Menu? (Y/Any Key)";:
X$=GET$:ENDPROC
```

Not just another average program

Author: Thomas How
Language: Basic
Filename: Mean/SD

OF the large number of statistical formulae two of the most commonly used are those to find the mean (average) and standard deviation (a measure of spread) of a data sample.

Calculating these on paper can take a while for large samples and as always is open to human fallibility. The program below circumvents this problem – providing the information entered is accurate – and displays the results in a matter of seconds.

When executed it requests you to enter the number of individual data items – values of X – which are to be input. A loop of this size is then constructed, and each of the values of X and their frequencies (F) can be entered. Once completed, the answers are displayed.

```
   10 REM by Thomas How
   20 REM (c) The Micro User
   30 MODE 7:PRINT '''"Mean and Standard
 Deviation calculator"''''"Enter data in
 following format:"''"Value of X"
   40 PRINT "Frequency (F) of that X"''"
Repeat process for each value of X"
   50 INPUT ''"How many data items ",d
   60 CLS:DIM data(d,1):FOR C=0 TO d-1
   70 INPUT '"Data 'X' ",N:data(C,0)=N
   80 INPUT "Frequency 'F' ",F
   90 data(C,1)=F:NEXT
  100 PRINT ''"Calculating..."
  110 M=0:V=0:FOR I=0 TO d-1:M=M+(data(I
,0)*data(I,1)):V=V+(data(I,1)):NEXT:mean
=M/V:PRINT '"   Mean = ";mean
  120 T=0:R=0:FOR I=0 TO d-1:T=T+(data(I
,0)*data(I,0)*data(I,1)):NEXT:R=T*(1/V):
A=R-(mean*mean):SD=SQR(A):PRINT "   Stan
dard Deviation = ";SD
```

IF you have written a routine that may be of interest to other readers, and suitable for publication in this column, do not hesitate to send it in on tape or disc along with documentation to: ***Stephen Wade, Routine Matters, The Micro User, Europa House, Adlington Park, Macclesfield SK10 4NP***

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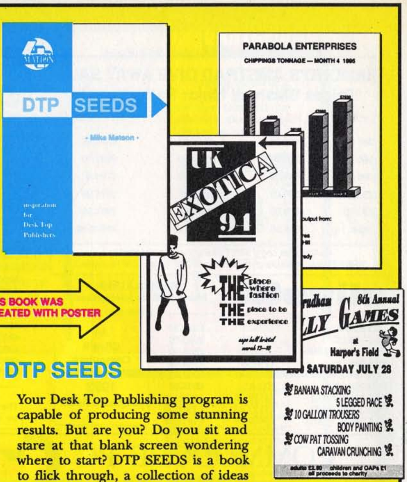
ALSO...

JIGSAW — allows sprites of any size to be converted into jigsaws with real jisaw-shaped pieces. It comes complete with a set of pictures including some by the well-known artist Rodney Matthews.

JIGLET — the version for younger users. It has fewer pieces and a more appropriate set of pictures.

CRAFTSHOP 1 and CRAFTSHOP 2 — programs allowing those with limited artistic ability to create some stunning results. Both packages are currently in use in thousands of schools and homes.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PROBLEM

Your technical questions answered by MIKE COOK

Topics on the agenda...

- Reading voltages directly
- Disc density defined
- Switching away from Opus
- Making more noise
- Going faster and faster
- Checking the speed

Reading the voltage

PLEASE can you advise me how I can use the analogue port on a BBC B or Master for measuring low voltages – zero to two volts – without recourse to external hardware like your Experimenter Board?

Unfortunately my school's computing budget won't stretch to the cost of the original board at this stage of the school's financial year.

Both versions of the manual fail to provide any practical details on how to wire up this port and programming in Basic. My own attempts at addressing the port – using *FX16,4 and ADVAL(1) – have failed miserably. Can you help? – **Ian Royston, Hemel Hempstead, Herts.**

● *I can only think that your lack of success is due to a faulty A/D chip because using it is really simple. There's no need to bother with the *FX16 command because the channels default to the enabled state.*

Simply wire up your voltage with the earth to pin 2 and the voltage to pin 15 then use.

```
A%=ADVAL(1)
```

to give you a value in A% – you can use any other variable in place of A%. However there will be some noise and a multiplication factor in this so I always use:

```
A%=ADVAL(1) DIV 64
```

This gives voltage readings in the range 0 to 1024, and every step counts.

Disc confusion

I AM a little bit confused about floppy discs, their drives and capacity. My box of spare 3M blank discs say they are double sided, double density and will hold 1.4Mb.

I understand that my BBC A3000 drive will only format to 800k but I have seen 1.4Mb drives advertised in PC magazines. Would it be possible to replace my existing drive with one of these? One other thing is that I have a lone black 3M disc that claims it is high density and will hold 2Mb unformatted. Again I can only format it to 800k, but when I borrowed a copy of a PC program on the same disc my PC Emulator wouldn't read it at all. But it was definitely all right because it worked on a friend's PC laptop.

Is the problem because it was saved using a 1.4Mb drive or is it because it's high density? – **Ben Howes, Carlton, Bedford.**

● *The 3.5in floppy discs come in three different types: Single-sided, used in the Acorn Electron Plus 3 interface and the early Apple Macintosh and they store up to 400k, this format is not used in new machines.*

Double-sided, used in the Master (using ADFS), Compact, Archimedes, Macintosh and PC. This is the current standard and stores 800k – 720k in the case of the PC, 640k on the Master and Compact.

The difference between single and double-sided is in the disc drive, not in the disc – a double-sided drive has a read/write head for both the upper and lower surfaces of the disc.

High density uses the same 80 tracks on both sides as the double-sided disc but stores 1.4Mb. This is achieved by making the magnetic pulses stored on the disc shorter, for this you need:

- *A disc controller and software to send twice as much data per sector.*
- *A disc drive with a head that can produce a much higher flux density.*
- *A disc coating that can store the higher flux density.*

The next point to mention is this concept of unformatted capacity, which is simply an advertising ploy since you can't use a disc which is unformatted.

Identifying true high density discs is fairly easy, they have a square hole in the plastic material on the side opposite the write-protect notch. A normal disc drive does not have a sensor for this hole and will treat all discs as double-sided ones.

The Archimedes has only a standard drive so will format to 800k only and if presented with a 1.4Mb disc won't be able to read it.

It is very likely that any new Acorn machines will be able to cope with high density, and some third party may well come up with an interface, but at present no upgrade is available.

Drive select links

I HAVE recently obtained a 5.25in, 80 track Epson disc drive which I understand is PC compatible. On connecting it to my BBC B (using standard leads) it simply ran continuously, refusing even to attempt to load a program.

I would like it to work so I am willing to build an interface for it but I have no data regarding the contacts on the drive's edge connector and I don't really know what's needed. I would very much appreciate your advice. – **Rowland Fraser, Kirkhill, Inverness-shire.**

● *Most 5.25in disc drives are compatible with the Model B so there's no need to build an interface. However what you may not have done is set the drive select links so that it responds to the drive zero signal.*

Also if this drive was removed from

➤

Is it fast enough? Consult the oracle!

DO you know whether anyone has published a set of tests for comparing the performance between 20MHz and 30MHz ARM3 chips installed in an A310?

I have had my machine upgraded and was informed that 80 nanosecond ram had been fitted along with a 30MHz ARM3 and the MEMC1a chip – but how can I tell whether lesser components have been installed?

There's no question that a MEMC1a is fitted, and the chips are HM514400ZP8s. I assume the 8 after the P refers to 80 nanoseconds, but how do I know that the ARM chip is 30MHz?

It has been reported in the computer press that some of the latest batch of ARM3 chips don't run reliably at 30MHz and it seems to me that with the memory cache switched off some of my programs run slower than they did before the upgrade.

Is there any way of finding out if it really is a 30MHz ARM3? – **John Beard, Doncaster.**

● *The simplest way is to look at the crystal: This is in a metal can and has the frequency printed on the outside, slower chips have to be fitted with lower frequency crystals.*

As far as the ram chips are concerned, the speed they run at is controlled by the upgrade, the access time of the chip is only the minimum time. If you fit chips capable of running faster than the rest of the hardware you don't get any improvement.

SOLVED

HELP

another system it might be lacking the terminating resistor pack. One of these packs must be fitted no matter how many drives you have – but there must be only *one.*

Unfortunately designs differ, so I can't tell you what type of you need. You'll need to take the drive to someone who knows.

Learning Curve

RECENTLY I upgraded from a BBC B to an A3000 and I would be grateful if you could answer some queries:

Would it harm the machine if I took a lead from the headphone socket to send the sound to the monitor's speaker or headphones via a volume control and switch?

Also I'd like to get some sort of user port for the machine, what would I need to buy and how would I access it?

Finally, could you recommend any books on how to writing Basic V and ARM code, I'm fairly good at programming on the BBC B, and I'd like to get into windows, sprites and other aspects of the machine. – **T. McGowan, Sheffield.**

● *There's no problem routing the sound the way you have described, but bear in mind the output is stereo and an appropriate jack plug will be needed.*

You can also send it to the AUX input of a stereo system, or buy the SoundBlaster system – as advertised in the Readers Offers – which is a simple but very effective amplifier.

A user port can be obtained from a number of sources including Acorn's I/O podule or from Morley Electronics. Other alternatives are the Body Building serial/parallel I/O from the February issue, or the currently running I^2C I/O system.

There are books on Basic V and ARM code published by Dabs Press so check their advert. You'll find that your Basic programming skills will be applicable to the new machine, but the A3000 is a vastly more complex machine and it may take a while to get to grips with it.

2MHz not enough

I HAVE a BBC B issue 7 for which I've built my own sideways rom/ram board to which I fitted a Rockwell 65C02 processor, having chosen the 4MHz version with the intention of making some modifications in order to utilise the extra speed.

However, after studying the circuit diagram of the micro I was rather confused as it is not quite as simple as supplying a 4MHz signal – from pin 12 IC43 for example.

In an attempt to obtain the answer from Solidisk, as they have accomplished this in the form of their 4Meg 256k ram board, I spoke to them in June last year and was told that they no longer make BBC Micro hardware and that everyone involved had left the company.

On inquiring about circuit diagrams they said "We've never had any circuit diagrams – it was all in their heads" which I found very hard to believe.

Are you able to tell me how to accomplish this extra speed – with a circuit diagram? If not, then any help would be appreciated. – **Adam Hamilton, Swindon, Wilts.**

● *As you found, it's not simply a matter of changing the crystal because the processor clock and the access to screen memory are interleaved.*

The screen access has to be at the normal speed because of the timing of the TV signals, in addition this clock is also stretched to 1MHz for access to the internal VIA, sound chip and other I/O devices.

The only way around these problems is to have the CPU with its own memory but making slow access to screen memory and roms. This is what Solidisk attempted to do, but it lead to all sorts of compatibility problems.

In short, it's just not worth it.

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PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

The Pineapple Software Real Time Colour Video Digitiser is now supplied with not just one, but two fully multitasking application programs! In fact the software supplied with each Digitiser comprises at least four different programs, (the number is increasing all the time). Included in these is the !Micci application which is probably the most user friendly of all video processing programs. (See photo).

HARDWARE

The Digitiser hardware consists of a double width podule which plugs straight into the back of a 300 or 400 series Archimedes. (Note that a podule backplane is required in 300 series computers).

For A3000 owners we supply a special inexpensive adapter box which contains the digitiser card and plugs into the back of the A3000 using a ribbon cable.

Inputs are provided for PAL composite video and also R,G,B. Manual adjustment of Contrast, Saturation and Brightness provide for ease of initial setting up.

SOFTWARE

The Heart of the Digitiser software is a relocatable module which contains all the video processing routines. All of the previously mentioned software applications access these routines in various ways. For the user who can write simple BASIC programs this module provides easy access to all of the Digitiser routines via '*' commands and SWI's

The new multitasking software makes life very easy for those who wish to incorporate images into Wordprocessing, Desktop publishing, or Art packages. The ease with which grabbed images can be 'zoomed in' and 'cropped' to the required size has to be seen to be believed, and when the required part of the image is selected, it is then a simple matter to 'drag' the image directly into another application.

As well as providing it's own powerful processing routines the Pineapple Digitiser can just as easily use software such as ChangeFSI or AIM to process it's images giving unrivaled versatility.

Also now available in the Multitasking software is a routine to allow capture of a sequence of frames. The number which can be stored depends on the amount of memory you have available (and the size of image chosen), and when grabbed the images can be stored to disc or transferred to PAINT for analysis.

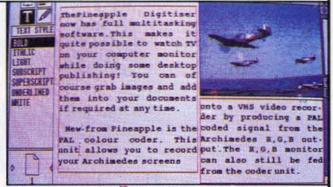
EXCLUSIVE FEATURES

The Pineapple Software Real Time Colour Digitiser is the only one currently llable with the following exclusive features:-

1. 16 bit operation (extended version) for smoother colour graduations.
2. Two independent multitasking applications plus other powerful software.
3. Digitising of the full video area normally displayed on a TV screen.
4. R,G,B inputs providing higher quality pictures from professional video equipment.

SPECIFICATION

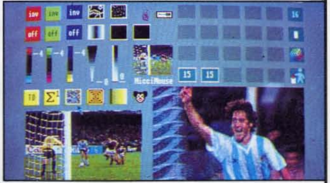
Video Inputs	Pal coded video. 75 volts – 2.5 volts pk to pk. R,G,B, & sync input All inputs may be terminated by internal DIP switches.
Resolution	512 x 256 pixels
Storage system	Standard version 4 bits Red, 4 bits Green, 4 bits Blue – 192k Ram Extended version 5 bits Red, 6 bits Green, 5 bits Blue – 256k Ram
Picture Area	The Digitiser hardware allows the full screen area normally viewed to be stored in the podule ram. Horizontal shift, Vertical shift and width can be adjusted internally if required.
PAL Decoder	The PAL decoder provides manual control of Brightness, Contrast and Saturation, combined with full auto saturation control.



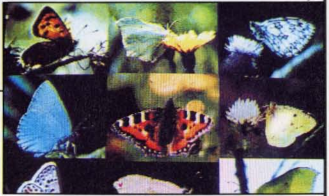
ThePineapple Digitiser now has full multitasking software.This makes it quite possible to watch TV on your computer monitor while doing some desktop publishing! You can of course grab images and add them into your documents if required at any time.

New-from Pineapple is the PAL colour coder. This unit allows you to record your Archimedes screens onto a VHS video recorder by producing a PAL coded signal from the Archimedes R,G,B output.The R,G,B monitor can also still be fed from the coder unit.

!Digi Multitasking Application



!MICCI Application



Butterfly collection

PAL COLOUR CODER

A new hardware product now available from Pineapple is a high quality colour coder video unit. This unit produces a full colour coded video signal from the Archimedes computer which enables you to feed the output of the computer into a video recorder or second colour TV monitor.

FEATURES:-

1. External to computer – no podule slots required.
2. Complete sync pulse regeneration to provide the best possible signal for recording onto VHS recorders or displaying on TV monitors.
3. Switch selectable to 624 or 625 line operation – for interlaced or non-interlaced screen modes.
4. Plugs into R,G,B, computer socket and provides buffered output to feed Archimedes monitor, + coded signal output.
5. Adaptable for use with other computers or R,G,B, and Sync signal sources.

S/CHS Version £79.00

Price £69.00 + VAT p&p free

- 'Pineapple has produced one of the 'ultimate' Computer Video Digitisers' –
- 'The Pineapple Colour Digitiser looks to be one of the most professional products yet to be seen on the Archimedes' –

Acorn User – April 90

Digitiser Prices

Standard	£285.00
Extended	£315.00
A3000 Adaptor Box	£65.00

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BBC PCB Designer

NEW LOW PRICES!!! NEW LOW PRICES!!!

This ever popular Rom based PCB designer is suitable for all BBC micros. It's fast high density 1:1 scale print routine allows prototype boards to be made directly from a printout, and a 2:1 scale print may also be used to produce professional quality boards. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' input rountine and allows any component to be 'picked up' and moved around the board without having to re-specify component interconnection.

The full auto-route facilities are available even on a standard unexpanded model 'B'.

'PCB Autoroute is remarkable. No similar software comes near the price. *Acorn User* – Aug 88

PRICE	EManual track routing	£55.00
	Auto track routing	£85.00
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P&P free

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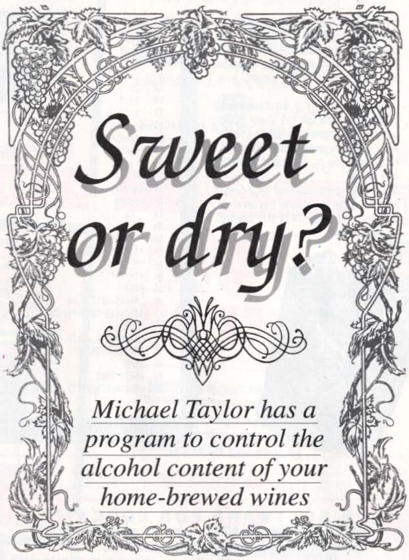
Access



Sweet or dry?

Michael Taylor has a program to control the alcohol content of your home-brewed wines

IF you enjoy a glass of home-made wine, you would probably like some way of working out how much sugar to add to your brew before you let the yeast get on with its job. The tables printed in the *How to ...* books are all very well, but you still need a calculator.

When you make wine, you soak the fruit – or whatever – in water for several days, which allows the sugar and flavour to leach out. This solution is called the *must*. Then you add yeast, which produces enzymes which turn the sugar into alcohol.

You have to control two things: The final alcohol level and the final sweetness. By using the specially written ViewSheet file given here you can enter the density of the must – found by using a hydrometer – the final alcohol content you want and the volume of the must.

The sheet then tells you the amount of sugar to add which, if totally fermented, will give you the required strength. The extra sugar, added for sweetness, depends on your personal taste so that's left up to you.

The sheet contains, as data, figures for the density of a solution, the amount of sugar it contains per gallon, possible alcohol requirements and the amount of sugar needed per gallon to achieve them.

It uses the desired alcohol content to do a lookup for sugar needed, works out from the density and volume how much suger you already have and tells you how much more to add to make one gallon of must of the right strength.

The lookup procedure isn't straightforward because the figures in the *%alcohol content* column are not integers, they are calculated, and used, to one decimal place. So we have to use the INT function on x10 the displayed figure, comparing it with INT x10 the figure you enter.

Unfortunately ViewSheet doesn't round to the nearest integer, but truncates towards zero, so INT(9.9) is 9 not 10 as we would prefer. To get round this we have to use INT(alcohol+0.05) which ensures the rounding is done the way arithmetic demands.

The spreadsheet uses three windows: One is the default in which everything is displayed, the second – called *winewdw* – while the third *winepnt* shows and prints only the

➤

```
   .......A .......B .....C .....D .....E .......F .......G .......H ...I
..1                   sugar  sugar                                      B
..2                %   IN     TO                                        x
..3 present  alcohol 1 gal  1 gal                                      10
..4 density  wanted    /g     /g   *****  *******  *******  *******   ***
..5    1010      0.9    57     71    204                                9
..6    1015      1.6   130    143   1065                               16
..7    1020      2.3   204    215                                      23
..8    1025      3.0   278    287                                      30
..9    1030      3.7   352    358         ENTER    ENTER    ENTER      37
.10    1035      4.4   425    430         PRESENT    %      PRESENT    44
.11    1040      5.1   483    502         DENSITY  ALCOHOL  VOLUME     51
.12    1045      5.8   542    574         (60 C)   WANTED   (PINTS)    58
.13    1050      6.5   600    646         BELOW    BELOW    BELOW      65
.14    1055      7.2   658    718          1020.0     12.1      7.0    72
.15    1060      7.9   716    790                    121.0             79
.16    1065      8.6   774    862                                      86
.17    1070      9.3   832    934         ADD        886.0  grams      93
.18    1075     10.0   890   1005         Dilute   to one   gallon    100
.19    1080     10.7   949   1077                                     107
.20    1085     11.4  1007   1162                                     114
.21    1090     12.1  1065   1247                                     121
.22    1095     12.8  1123   1332                                     128
.23    1100     13.5  1181   1417                                     135
.24    1105     14.2  1239   1503                                     142
.25    1110     14.9  1297   1588                                     149
.26    1115     15.6  1356   1673                                     156
.27    1120     16.3  1414   1758                                     163
.28    1125     17.0  1472   1843                                     170
.29    1130     17.7  1530   1928                                     177
.30    1135     18.4  1588   2013                                     184
```

Figure I: The sheet viewed without windows

```
ENTER    ENTER    ENTER
           %       IN     TO
present  alcohol  1 gal  1 gal
density  wanted     /g     /g
   1010      0.9     57     71
   1015      1.6    130    143
   1020      2.3    204    215
   1025      3.0    278    287
   1030      3.7    352    358
   1035      4.4    425    430
   1040      5.1    483    502
   1045      5.8    542    574
   1050      6.5    600    646
   1055      7.2    658    718
   1060      7.9    716    790
   1065      8.6    774    862
   1070      9.3    832    934
   1075     10.0    890   1005
   1080     10.7    949   1077
   1085     11.4   1007   1162
   1090     12.1   1065   1247
   1095     12.8   1123   1332
   1100     13.5   1181   1417
   1105     14.2   1239   1503
   1110     14.9   1297   1588
   1115     15.6   1356   1673
   1120     16.3   1414   1758
   1125     17.0   1472   1843
   1130     17.7   1530   1928
   1135     18.4   1588   2013
```

Figure II: Using the winewdw window

```
         ENTER    ENTER    ENTER
         PRESENT    %      PRESENT
         DENSITY  ALCOHOL  VOLUME
         (60 C)   WANTED   (PINTS)
         BELOW    BELOW    BELOW
          1020.0     12.1      7.0

         ADD          886  grams
         Dilute   to one   gallon
```

Figure III: Using the winepnt window

```
Default Windows

0   A1   A19  -   7  3  FRM   V
1   B1   B19  R0  7  3  D1RM  VS
2   C1   D19  R1  5  3  D0RM  VS
3   E1   E19  R2  5  3  D0RM  VS
4   F1   H19  R3  7  3  D1RM  VS
5   I1   I19  R4  3  3  FRM   VS

For print windows extend bottom right
of all to 30 and convert all options
to VST.

Window Winewdw

0   A1   A19  -   7  7  FRM   V
1   B1   B19  R0  7  3  D1RM  VS
2   C1   D19  R1  5  3  D0RM  VS
3   E1   E19  R2  5  3  D0RM  VSO
4   F9   H14  R3  7  3  D1RM  VST
5   F17  H18  B4  7  3  FRM   VST
6   I5   I24  R7  7  3  FRM   STO

For print windows extend bottom right
of 0, 1 and 2 to 30. Include options
S and T throughout.

Window Winepnt

0   F9   H14  -   7  3  D1RM  VST
1   F17  H18  B0  7  3  FRM   VST
```

Figure IV: The window descriptions

➤

entered figures and the calculated result.

To use the sheet enter:

```
LOAD wine
LOAD WNDOW winewdw (or winepnt)
```

Without windows you'll see something like Figure I – the entered values in slots F14, G14 and H14 are for last year's damson. Column A lists possible densities of the must in the curious units that vintners use (g/m^3).

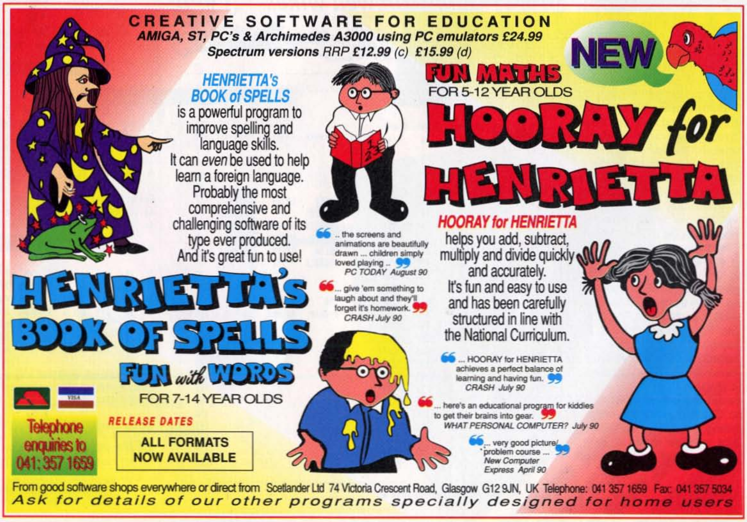
Column B shows the usual values for alcohol content while Column C tells you the mass of sugar in one gallon of your must. Column D tells you how much sugar you need in that gallon to give the alcohol you crave.

But, of course, you don't have just a gallon of must, so the sheet works out the total mass of sugar you really have and how much extra you need, reminding you to dilute the liquid to one gallon.

● *So now you can adjust your home brewed wine to exactly the level of alcohol and sweetness you desire. I'll drink to that.*

```
C1  sugar                       F9  ENTER
D1  sugar                       G9  ENTER
I1   B                          H9  ENTER
B2     %                        F10 PRESENT
C2   IN                         G10   %
D2   TO                         H10 PRESENT
I2   x                          F11 DENSITY
A3  present                     G11 ALCOHOL
B3  alcohol                     H11 VOLUME
C3  1 gal                       F12 (60 C)
D3  1 gal                       G12 WANTED
I3  10                          H12 (PINTS)
A4  density                     F13 BELOW
B4  wanted                      G13 BELOW
C4    /g                        H13 BELOW
D4    /g                        F14 (your value)
E4  *******                     G14 (your value)
F4  *******                     H14 (your value)
G4  *******                     G15 INT((G14*10))
H4  *******                     F17 ADD
A5  1010                        G17 INT(E6-((H14/8)*E5))
B5  .9+(A5-1010)*.14            H17  grams
C5  56.7+(A5-1010)*14.7417      F18 Dilute
D5  70.87                       G18 to one
E5  LOOKUP(F14,A5A30,C5C30)     H18 gallon
I5  INT((B5+.05)*10)
A6  A5+5                        Slots B5, C5, I5 and D6 are all
D6  D5+71.8862                  replicated (relative) down to row
E6  LOOKUP(G15,I5I30,C5C30)     30.
```

Figure V: The spreadsheet data



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• Pipedream 3	£119
• Desktop Office – Database, Graphs & Charts, Wordprocessor Spreadsheet, Communications	£98
• Desktop Folio – Wordprocessor, Desktop & Interactive Publishing. Ideal for school environment.	£85

Graphics, Art, Design & Games

GRAPHICS

Atelier	£65
Artisan II	£47
Autosketch II	£68
Craftshop 1 & 2	£28
Euclid 2	£52
Graph Box	£59
Kermit	£46
Mogul	£19
Poster	£79
Pro Artisan	£72
Render Bender	£58
Snippet	£26
Tween	£25

GAMES

ArcPinball	£18
Apocalypse	£21
Arcade Soccer	£15
Avon	£16
Break 147	£20
Bug Hunter	£14
Caverns	£14
Chocks Away	£18
Conqueror	£18
Cops	£14
Corruption	£18
Drop Ship	£15
Enthar Seven	£22
E-Type	£17
E-Type Designer	£15
E-Type Extra 100 miles	£15
Holed Out Designer	£15
Holed Out Golf	£15
Hostages	£15
Ibix the Viking	£14
Inter Dictor 2	£26
Iron Lord	£17
Jet Fighter	£10
Magpie	£39
Manchester United	£19
Nevryon	£14
Olympics	£15
Power Band	£20
Real McCoy	£22
Redshift	£14
Return to Doom	£16
Revelation	£54
Repton 3	£15
Rotor	£20
Sporting Triangles	£24
Superior Golf	£15
Talisman	£12
The Pawn	£19
Thundermonk	£11
Trivial Pursuit	£23
Twin World	£17
U.I.M.	£23
White Magic	£15
White Magic 2	£15
Wimp Game	£15

Miscellaneous

Ancestry	£59
Arccomm Pack	£24
Arcterm 7	£69
Armadeus Sound	£60
BBC DFS Reader	£6
Genesis	£65
Genesis 2	£125
Hearsay Comms Pack	£50
JX Archi Colour Printer Driver for Citizen & Star	£15
Numerator	£66
Rhapsody in Blue	£39
Toolkit (Clares)	£42

LANGUAGES (Archimedes)

ISO-PASCAL; FORTRAN 77			£77 each
ANSI C Release 3			£125
Assembler; LISP or Prolog X			£149 each
LOGOTRON LOGO			£55
ROBO LOGO	£69	TWIN EDITOR	£25
RISC BASIC	£120	BASIC Compiler	£77

Minerva's Archimedes Software

Sigmasheet	£39	Sales Ledger*	£53
Home Accounts*	£36	Purchase	
Stock Manager*	£53	Ledger*	£53
Nominal Ledger*	£53	Reporter	£29
Ancestry	£59	Mailshot*	£29
System Delta+	£55	MultiStore	£195
System Delta + Reference Manual			£25
Order Processing/Invoicing*			£53
School Administrator			£118

** Requires System Delta*

NEW Business Accounts Packages
Nominal Ledger, Order Processing/Invoicing, Purchase Ledger, Sales Ledger & Stock Control
Price: **£78** per Module or
£299 for complete package

ULTIMUM – Archimedes A3000 Podule Racking System

THE ONLY LOGICAL WAY TO EXPAND YOUR A3000 COMPUTER

The accepted standard for Archimedes computer expansion is the Acorn Podule, designed initially to fit the old 310, and also for the later A400 and A400/1 series micros. The podules fit inside these computers up to four at a time. The A3000 is the little brother of the family, but can only have one podule at a time, plugging into the back of the computer.

Other attempts have been made to expand the A3000 by trying to introduce a 'mini-podule'. This is impractical for many reasons, amongst which is the reluctance of manufacturers to produce them. Nobody wants to re-design podules already produced. Some cannot be produced on a 'mini-podule' as they are far too complicated and simply wouldn't fit.

Watford Electronics listens to the demands and requirements of its customers, and we are glad to say that we have come up with the only real solution to the A3000 expansion problem. The ULTIMUM Podule Racking System allows up to three FULL SIZE standard Archimedes 300/400 series podules to be fitted to the computer. In addition, there is also provision for a hard disc drive and a podule to be fitted internally.

Since the ULTIMUM Podule Racking System takes proper full size podules, you will be able to use any of the currently available peripheral equipment, from companies like Computer Concepts, Armadillo, Acorn and of course, our own brand.

Fitting the podules to 'ULTIMUM' is simple. They are neatly fitted inside the metal case of the rack, avoiding the previously untidy method of hanging the podule off the back of the computer, risking damage to both, it and to the computer.

'ULTIMUM' has its own power supply, so no strain is put on the A3000 power supply. There is also an IEC mains output socket for an Acorn type monitor so reducing the number of plugs required to go to the mains. The ULTIMUM is rigidly clamped over the top and under the computer, and allows direct access to the floppy disc drive and reset button, rather than obstructing access as on other systems. One can also place a standard monochrome or 14" colour monitor (even a multiscan type) safely on top. The mounting method employed is so firm that the computer could even be safely transported without the assembly falling apart.

Price: £125

Archimedes A300/A400 SCSI Hard Disc Offer

(while stocks last)

100MB Hard Disc Upgrade complete with Controller card, Cables, Formatter and Manuals

RRP: £1030

Offer Price: £499

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.

New RISC OS Version **Only £15**

Archimedes External Disc Drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead.

- A300/A3000 £21
- A400 £25

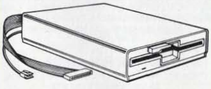
Special Education Prices

All education establishments qualify for special education prices on micros, etc. Please write in or telephone (0923) 37774 or 50335 for written quotation.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399** *(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during May

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	£115
Econet Module for the Master	£45
Twin ROM Cartridge for Master	£9
Quad ROM Cartridge for Master	£14
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref Manual	(No VAT) £17
64K Upgrade Kit for B+	£32
Acorn 1772 DFS Kit complete	£49
ECONET Upgrade Kit for BBC B	£42
ALL ECONET UPGRADES Available	
ARIES' IEEE Interface for BBC B & Master	£238
Morley Teletext Adaptor with ATS Rom	£99
Ecolink	£270

(Carr. £2 to £7 depending on the weight)

0% Finance Now Available

On Acorn Archimedes A3000 and A420/1 with learning curve packs. (Please telephone for details)

Commander Joystick

Watford Electronics' new Commander Joystick for the BBC B and Master 128K has a unique dual mode of operation giving selective free floating or self centring fully variable control in both X and Y axis directions. Commander is particularly good for flight simulation and drawing programs.

Features:

- Direct connection to BBC Analogue input port – no interface needed.
- Fully compatible with all BBC Joystick controlled games programmes.
- Switchable springs allow selection of floating or centring operation.
- Trim adjusters for both X and Y axes for fine centre adjustment.
- Convenient stick mounted fire button with additional base buttons.

Launch Price: £15

Watford's Scottish Dealer

We are pleased to announce the appointment of Messrs Computer Depot as Watford's official Scottish Dealer. The full range of our BBC/Acorn products is now available from their Dundee, Edinburgh & Glasgow shops. Their technical staff will be very happy to discuss all your peripherals' requirements.

Archi Mouse Port Splitter

Continuous plugging and unplugging of the mouse is not only inconvenient but can also damage your micro. Our handy little Archi mouse port splitter unit eliminates this risk by allowing you to connect a mouse and a joystick or a tracer ball simultaneously to your Archimedes micro. The miniature slide switch on the box enables you to select the socket to be used. **£15**

Education Software

- Advanced Folio: 7-14 years. Has the simplicity of a basic wordprocessor with the presentation quality of a Desk Top Publisher £38
- Colourcopter & Numbercopter: 4-7 years. Flying start in pre-reading and pre-number skills
- Colourcopter includes 7 programs to develop matching, sorting, coordination, letter & word recognition £28
- Numbercopter: Includes 8 programs to develop memory, sequencing, logic, number, more and gone away, word order and rhythm skills £28
- Concept Keyboard Podd 5-11 years: This concept keyboard version of Podd encourages less able and young children to join in the fun of discovering the 116 actions which podd can perform. Simple to operate £23
- Best Four languages 5-11 years: Four best selling programs which encourage children to work together to improve their linguistic ability £33
- Hands on Spelling 5-11 years: Promotes a visual approach to mastering spelling, linking the skill with other National Curriculum areas as hand writing, talking and reading. £30
- An Eye for Spelling 7-14 years: Manages and motivates children, learning to spell with individual attention. It uses Charles Cripps' visual approach to help reluctant spellers by encouraging them to look at the internal structure of words. £24
- Asian Folio – Gujarati 80T £45
- Best Four Languages £35
- Best Four Maths £35
- Frieze 7-16 years £37
- Kaleidoscope 7-16 years £37
- Merlins Castle £22
- Maths 9-13 years £25
- Number in the National Curriculum £55
- Screenprint pack of 5 5-16 years £150
- Time Traveller 7-16 years £40
- The Lost Frog £22
- World Map Study 7-16 years £35

(More Educational software on page 10)

Continued→ → → → → → → → →

Archi A4 Scanner

This new A4 image scanner from Watford Electronics is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the !HELP application on the Acorn applications discs.

The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.

Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.

Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.

All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

Introductory Prices:

Archi A4 Scanner	**£349**
Sheet Feeder for above	**£95**
Scanner + Sheet Feeder	**£419**

Z88 Portable Micro

£185

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

Z88 ACCESSORIES

• 32K RAM Pack or 32K EPROM Pack	**£18.00**
• 128K RAM Pack or 128K EPROM Pack	**£42**
• 512K RAM Pack	**£175**
• Z88 Eprom Eraser Unit	**£33**
• Z88 Spellmaster for Pipedream	**£51**
• Z88 Carrying Case	**£8**
• Z88 Computing Book	**£9.95**
• AA Nicad Rechargeable Battery	**£1.50**
• Battery Charger Compact & Fast	**£6**
• Z88 Serial Printer Cable	**£8**
• Z88 Parallel Printer Cable	**£25**
• Z88 to Archi Link	**£15**

• Z88 to BBC Link	**£20**	• Z BASE	**£56**
• Z88 to PC Link II	**£30**	• Z TAPE	**£42**
• Z88 to Macintosh	**£52**	• Z TERM	**£42**
• Z88 Mains Adaptor	**£9**	• Z88 Modem	**£149**

Archi Real-Time Digitiser

Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	**£16**
New Risc-OS Software Upgrade	**£39**

Archi Graphic Tablet

The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic for use in Education).

(FREE this month, PC Mouse Drivers & Art package)

Special Price £199

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£15**

Archi Graphic Tablet Junior. Working area 9" x 6". Price includes Stylus £125

Disc Plonker Rack

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

• Watford sophisticated DFS ROM	**£16.00**
• Watford DFS Kit complete	**£69.00**
• We will exchange your existing ROM for Watford's ultimate DFS ROM at only	**£12.00**
• DFS Manual (comprehensive)	**£6.95**
• Acorn DNFS ROM	**£17.00**
• Acorn ADFS ROM only	**£25.00**
• Acorn 1772 DFS ROM Kit	**£49.00**

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

• SPECIAL PRICE	**£44.00**
• DDFS Manual	(No VAT) **£6.95**
• We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£30.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

• *10 x 5.25" S/S D/D 40T (744)*	***£5***
• *10 x 5.25" D/S D/D 40T (745)*	***£5***
• *10 x 5.25" S/S D/D 80 Track (746)*	***£7***
• *10 x 5.25" D/S D/D 80 Track (747)*	***£7***
• *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	***£11***
• *10 x 3.5" S/S D/D 40/80 Track*	***£7***
• *10 x 3.5" D/S D/D 40/80 Track*	***£8***
• *10 x 3.5" Double Sided High Density*	***£15***

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

● *10 x **M3** 3.5" D/S D/D 80 Track*	*£7*
● *10 x **M9** 3.5" D/S High Density*	*£12*
● *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
● *10 x **M5** 5.25" D/S D/D 40 Track*	*£5*
● *10 x **M7** 5.25" D/S D/D 80 Track*	*£7*
● *10 x **M8** 5.25" D/S H/D Hi-Density*	*£12*
● ***M2** 3" Double Sided*	*£2.50 each*

VISA

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted.

Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

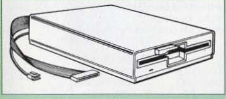
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, are the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

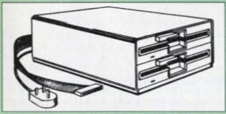
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. **Ideal for Schools & Colleges.**

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space. Your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

"Test Bureau Approved for Use in Education"





Our Disc Drives conform to BS415

Type	Description	
	Disc Drive without PSU	
• **CLS400S:**	Single, 40/80 track 400K Double sided Drive	£72
• **CLD800S:**	Twin, 40/80 track, 800K Double sided Drives	£142
	Disc Drive with PSU	
• **CS400S:**	Single, 40/80 track, 400K Double sided Drive	£82
• **CD800S:**	Twin, 40/80 track, 800K Double sided Drives	£155

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Disc Drive/DDFS Offer

- The popular CLS400S 40/80 track switchable disc drive.
- Watford's popular Mk II DDFS Interface (allows up to 720K storage). Will run both in single & double density modes.
- A comprehensive DFS Operating manual

Bargain at Only **£119** (Offer valid until stocks last)

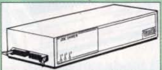
3.5" DISC DRIVE

These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• **CLS35:**	Single Disc Drive, 400K	£62
• **CLD400S:**	Twin Disc Drives, 800K	£109
	Disc Drive with PSU	
• **CS35:**	Single Disc Drive, 400K	£83
• **CD35:**	Twin Disc Drives, 800K	£126

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

Disc Drive Sharer

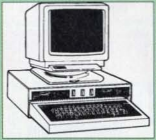


(Ideal for educational establishments)

A low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Price includes 3 Cables £55

Disc Drives in Monitor Stand



- **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

- **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5".

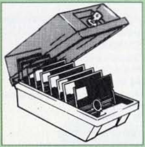
£154

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units

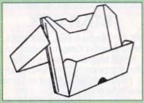


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

• **M35** – holds up to 50 5.25" discs	£4.95
• **M85** – holds up to 95 5.25" discs	£6.95
• **M25*** – holds up to 25 3.5" discs	£4.95
• **M50** – holds 50 3.5" discs	£6.50
• **M10** – holds 8 of No. 10 Data Cartridges	**£15**

* Not lockable

Plastic Library Cases



Holds up to 10 x 3.5" Discs.	**£1.50**
Holds up to 10 x 5.25" Discs.	**£2.00**

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
• Without Sleeves 5.25"	£30	£35	£40
• With Sleeves 5.25"	£33	£38	£43
• 3.5" D/S D/D	£29 for 50		£52 for 100

Continued→ → → → → → → → →

12 months FREE maintenance on site

Microvitec Monitors

• **1431** – Standard Resolution Monitor	£172
• **1451** – Medium resolution, suitable for word processing in mode 0	£215
• **Cub3000** Medium Res for A3000	£195
• **1441** – High res, exceeds the capabilities of the BBC Micro	£359
• **2040 CS** 20" Hi Res	£675
• Dust Cover for Microvitecs	£5.50
• **Touchtec 501 Touch Screen**	£239

Multiscan Colour

• Eizo 9060S	£389	• NEC 4D	£685
• Eizo 9070S	£579	• Taxan 770LR	£383
• Panasonic	£325	• Taxan 775	£383
• NEC 2A	£289	• Taxan 795-PC	£430
• NEC 3D	£358	• Taxan 875	£565
• VIDC Enhancer Board			£25

(P.S. Taxan 795 monitor is supplied with a FREE VIDC enhancer board)

Philips

• **BM7502** 12" Hi-res Green Monitor	£70
• **CM8833** 14" Med. Res Colour Monitor	£178

STAR BUY

• **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor . A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £176

Dust Cover for Philips Monitors £6

(Securicor carriage on Monitors £7)

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

Canon Bubblejet Printers

Type	Printer	CS Feed	Ink Cart
BJ10E	£219	£54	£18
BJ300	£375	£88	£12
BJ330	£445	£110	£12

NEC Pinwriter Printers

• P20	£198	• P70	£485
• P30	£257	• P90	£655
• P60	£379		

Be Satisfied Before You Buy

We have on display, various Micros, Printers, Disc Drives, Monitors, etc. Call in at our showroom to evaluate before you buy.

Concept Keyboards

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Microvitec and Multiscan colour monitors, all Panasonic printers, and all Laser Printers, Roland Plotters and of course the full range of Archimedes micros. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours. (Offer applicable only when bought at prices advertised in this advert. UK mainland only).

Hewlett-Packard Printers

• Desk Jet 500	£368	• Paintjet XL	£1155
• Desk Writer (Mac)	£482	• Quiet Jet Plus	£376
• Desk Jet Cartridge	£15	• HP Think Jet	£240
• Paint Jet Colour	£625	• Rugged Writer	£849

• Paintjet Cartridges Black £19; Colour	£25
• Desk Jet 500 256K RAM cartridge	£129
• HP Epson FX Emulation Cartridge for Desk Jet	£59

HP Apple Talk Interfaces for

• Scan Jet	£299	• Paint Jet	£POA
• Desk Jet Unlimited (Book No VAT)			£19.75

Panasonic Printers

FREE with every **KX-P1081 & KX-P1180** Printers: A printer lead (please specify type required) and a Dump Out 3 ROM for the BBC Micro or 1,000 sheets of paper for other micros (please specify)

• **KX-P1081** 9pin 80col. 144/28 cps	£122
• **KX-P1180** 9pin 80col. 192/38 cps	£129
• **KX-P1123** 24pin 80col. 192/63 CPS	£165
• **KX-P1124i** 24pin 80col. 192/63 CPS	£224
• **KX-P1624** 24pin 132col. 192/63 CPS	£299
• **KX-P1695** 9pin 132col. 330/86 CPS	£299
• **KX-P1654** 24pin 132col.	£439

Above prices include FREE, Watford's 12 months on-site maintenance

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-1124 (P36)	£85	KX-P1180 (P37)	£79
KX-P1624/1695 (P38)	£124	KX-P1123 (P37)	£79

Buffers

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17	P1081/1592	£32	**P19**	P1124/1180	£55

Citizen Printers

120D Plus	£99	124D Printer	£165
Prodot 9	£239	Prodot 24	£339
Swift 9	£149	Swift 24#	£216

• Prodot Cut Sheet Feeder	£120
• Swift 24 Colour Option	£32
• Swift 24 Ribbons Black £4	Colour £13

Special Offer this month – A FREE Colour option cartridge with every Swift 24 printer purchased from us.

Star Printers

• **LC10** 9pin 80col. 144/36 CPS	£117
• **LC15** 9pin 136col. 180/45 CPS	£195
• **LC24-10** 24pin 80col. 180/60 CPS	£163
• **LC24-15** 24pin 136col. 200/67 CPS	£305
• ***FR10** 9pin 300/76 CPS 31K 16 fonts	£259
• **FR15** Wide carriage version of above	£319
• ***XB24-10** 24pin 80col. 240/80 CPS	£319
• **XB24-15** 24pin 80col. 240/80 CPS	£389
• **XB-24** Colour Kit	£35
• **LC-200** Colour 9pin 80col. 180/45 CPS	£160
• **LC-24-200** 24pin 80col. 222/67 CPS	£195
• **LC24-200** Colour 24pin 80col. 222/67 CPS	£230

*FREE Colour Ribbon with these printers

Star Accessories

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139

Serial Interfaces

SPC-10	LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200	£49
8K Ser	LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15	£64

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour £29

Buffers

32K Ram Card for LC/XB24-10; 15; LC200 £55

Ribbons

LC10; LC10-II; LC15	Black £4;	Colour £6
LC-200; LC24-200	Black £5;	Colour £12
XB24-10; XB24-15	Black £5;	Colour £12

Laser Printers

• Canon LBP-4	4ppm	£690
• Canon LBP-8 IIIR	8ppm	£1535
• Canon LBP-8 IIIT	8ppm	£1410
• Epson EPL7100	6ppm	£720
• HP Laserjet III	8ppm	£1035
• HP Laserjet IIID	8ppm	£1539
• Laserjet IIIP	8ppm	£775
• Panasonic KX-P4420	8ppm*	£659
• Panasonic KX-P4450i*	11ppm*	£1075
• Panasonic KX-4455 Postscript	11ppm*	£1699
• Qume Crystal Print Publisher 2		£1899
• Star LP-8 III		£985
• Star LP-8 Star(post)script		£1215
• Star LP-4 4ppm		£735
• Star LP-4PS Postscript 4ppm		£927

* Now 2 years warranty

Laser Toners

Canon 2 & 4	£54	Laserjet II & IIP	£55
Epson GQ	£18	Laserjet III	£75
Star LP-8	£69	Qume Crystal	£56
KX-P4420/50	£22		

Laser RAM Upgrades

• IIP & III 1MB	£74	• EPL7000 2M	£365
• IIP & III 2MB	£109	• GQ5000 512K	£95
• II & IID 1MB	£76	• KX4420/50 1M	£115
• II & IID 2MB	£112	• KX4420/50 2M	£159
• II & IID 4MB	£299	• KX4420/50 4M	£349
• Canon LBP4 1M	£175	• Star LP8 1M	£143
• Canon LBP8 2M	£150	• Star LP8 2M	£285

Laser Drum & Developer

• Epson Drum	GQ5000	£93	EPL7100	£129
• Panasonic 4420	Drum	£60	Developer	£59
• Panasonic 4450	Drum	£93	Developer	£80
• Qume Drum		£76	Developer	£56

Jetpage Postscript Cartridge

• HP IIP/III	£255	IID & IIID	£265

NEW – HP Laserjet

Various Font Cartridges	£45
Superset Font	£195

Integrex Colour Jet

• Colour Jet 132 Printer	£515
• Paper Roll	£6.50
• BBC Screen Dump Software	£10
• Colour Cartridge	£19.50
• Black Cartridge	£11.25
• Black Textile Cartridge	£17
• 100 A4 OHP transparencies	£55
• 8K Serial Interface Optional	£123

Special Offers this month

Canon BJ 10E Printer	£219
HP Deskjet 500 Printer	£349
Panasonic KX-P1123 Printer	£162
Panasonic KX-P1592	£199
TAXAN 795 Trinitron	£435

Epson Printers

DFX5000	£1105	LQ860 Colour	£489
DFX8000	£2070	LQ1050+	£520
EX1000	£535	LQ1060	£606
FX850	£294	LQ2550+	£729
FX1050	£368	LX400	£116
FX1060	£599	LX850	£179
LQ400	£178	SQ850	£459
LQ550	£246	SQ2550	£719
LQ850+	£425		

Cut Sheet Feeders for

LX400/800/850/LQ400/500/550			£69
EX800/FX800/850/LQ800/850			£130
FX/LQ 1000/1050/SQ850			£159
LQ 2550	£390	SQ2550	£390

Tractor Feed for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

Accessories

• EX800/1000 Colour Option	£45
• EX800/1000 Colour Ribbon	£14
• LQ2500 Colour Option	£65
• Multifont Card for LQ550/850/1050	£95

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£95	RS232 + 8K Buffer	£75

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£6
IBM/Archimedes Parallel Lead 5 metres	£13
IBM/Archimedes Parallel Lead 10 metres	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Plotters

HP Plotters

• HP7440	£425	• HP7475	£615

Roland Plotters

• DXY1100	£515	• DXY1200	£655
• DXY1300	£865	• DXY2500	£2375
• DPX3500	£3385	• Sketchmate	£380
• Roland plotter Pens, Fibre tip			£7.50

Roland SketchMate

The Intelligent Graphic Plotter

The SketchMate offers the same high performance and versatile function of larger, more expensive plotting systems, but at an affordable price. It is very compact and lightweight. In restricted space, it can be operated in a tilted position. Is compatible with virtually all CAD software as well as a wide range of business softwares. The 'ArtMate' software package supplied, is designed to be used with IBM PC/AT systems.

Specifications: Plotting area: 297 x 216mm. Number of Pens – 8. Magnetic Paper holder. 5K Buffer. Parallel and RS 232 Serial interfaces. Accessories: 8 pens, AC Adaptor, 4 x Magnetic paper holders, User manual, marking sticker, Rubber sticker, 10 x A4 test paper, 2 x A4 OHP transparency film. Dimensions: 360(W) x 410(D) x 105(H)mm. Weight 2.6 Kgs.

Launch Offer: £380

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Listing Paper (Perforated)

• 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
• 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
• 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£21
• 1,000 Sheets 15" x 11" Fanfold Paper	£9
• 2,000 Sheets 15" x 11" Fanfold Paper	£16
• 1,000 Sheets true A4 Fanfold Paper 70gms	£11
• 2,000 Sheets true A4 Fanfold Paper 70gms	£21
• Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

Special Offer

Hitachi/Acorn 12" High Resolution, ergonomically designed Colour Monitors. Supplied complete with a swivel base and a BBC lead.

Only: £145 (While stocks last)

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	**£6.00**	–
BBC Micro	–	**£3.50**
BBC Master	–	**£4.00**
Archimedes Micro pair	–	**£9.00**
Citizen 120D	**£2.75**	**£4.50**
DMP2000	**£2.75**	**£4.75**
EX800/1000	**£3.50**	**£5.00**
RX/FX80/85/800/MX80	**£2.95**	–
FX/MX/RX100/1000	**£3.95**	–
Kaga/Taxan KP810/815	**£3.25**	**£5.00**
LQ400/500/550/800/850	**£3.25**	**£6.00**
LQ1050/LQ2500	**£4.00**	–
LX80/86/800/850	**£2.75**	**£4.50**
LX400	**£3.50**	**£5.00**
M1009/GLP	**£2.95**	**£3.75**
NEC P2200	**£4.50**	**£5.00**
Panasonic KX1080/81	**£3.25**	**£4.75**
Panasonic KX-P1124	**£7.50**	**£5.00**
SQ2500	**£23.00**	**£5.50**
Star LC10/NL10	**£2.75**	**£5.00**
Star LC24-10	**£2.95**	**£6.00**
Olivetti Ink Jet Cartridges (set of 4)	**£9**	

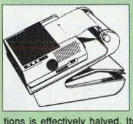
Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£7
P115 for KX-P1180/P1624	£7
P145 for KX-P1124	£8
P140 for KX-P1540	£10
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	**£9.95 each**

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergon-omic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics
2 to 1	£16	£17
3 to 1	£22	£24
5 to 1	£36	£32

(Cables extra at £6 each. Please specify type required when ordering)

2 Way Compact Printer Switch

A handy 2 way printer switch. Enables one micro to be connected to 2 printers or vice versa.
Centronics **£18;** Serial **£17**
(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£36	£39
4 to 1	£59	£55
8 to 1	–	£85

256k Multi Spooler

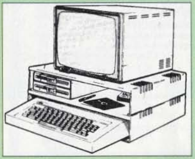
These Auto Centronics Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

• 2 In/2 out	£135	• 4 In/2 out	£169
• 8 In/1 out	£199		

Compact Converter Units

Serial to Parallel	£36	Parallel to Serial	£37

Plinths for the BBC B & Master 128K Micros

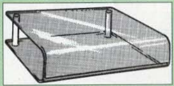


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Continued→ → → → → → → → →

QUEST MOUSE Mk III

• Quest Mouse III & Quest Paint	£59
• Quest Mouse III, Quest Paint, AMX Stop Press & Pagefont	£89
• Quest Mouse III only	£30
• Quest Paint Software only	£34
• Quest Font Disc (22 Text Fonts)	£15
• Quest Mouse Mat (Red or Blue or Green please specify)	£3
• Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer	£18

(P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

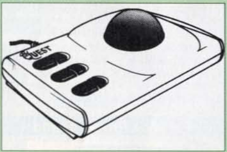
ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £32

Quest – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version	**£27**
QT-20 Archimedes Version	**£30**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

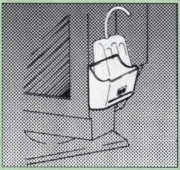
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

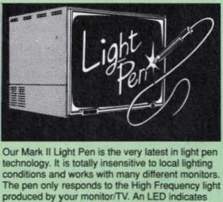
WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk.

It protects it from damage when not in use, yet within easy reach when you need it again. At £4 it does not cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

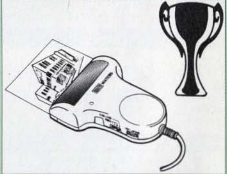
£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

The Beeb HandScan

Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware £135

WAPPING EDITOR
"MIGHTIER THAN THE QUILL"

Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack	**£69**
Wapping Editor plus Mouse	**£89**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

NEW

At the request of many of our customers we are now able to offer training in the use of Wapping Editor DTP package. For further information please telephone 0923 37774 and ask for Tim or Shiraz

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc. Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only).

£13

Laser Direct

By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Special Price: £849

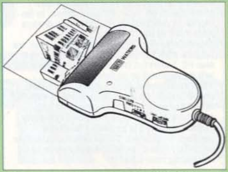
• Special High Res Laser Direct Card 600 DPI for Canon LPB4 Laser Printer	**£325**
• LPB4 Printer plus High Res Card	**£1025**

(For demonstration, call in at our retail shop)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

All prices are exclusive of VAT

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

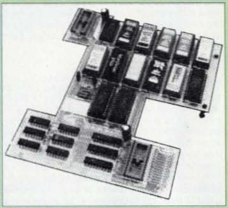
AHS-4 Archi 300/400 Version	**£149**
AHS-3 Archi A3000 Version	**£175**

Continued→ → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accommodation is available to single persons if required. Telephone Keith Archer or Shiraz Jessa for interview, or write to us enclosing your CV.

Solderless Sideways ROM Socket Board



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

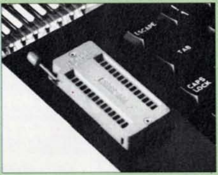
User Port Splitter Unit

User PortSplitter
A
B

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B and B+ compatible.

ONLY **£18** (carr £3)

BBC B Low Profile Cartridge System

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

• Complete System	**£11**
• Spare Cartridges	**£2.75**
• Spare Rack	**£1.65**

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9**; Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted	£3

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	**£36**
	Aries B-12C	**£5**

Aries B-488 IEEE-488 Interface Unit

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

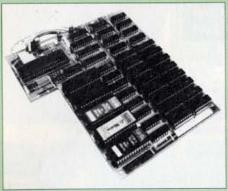
Voltmace Joysticks

Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B

Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

ROM/RAM Card



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

PRICES:

ROM/RAM card with 32k dynamic RAM	**£48**
ROM/RAM card with 64k dynamic RAM	**£65**
ROM/RAM card with a massive 128k dynamic RAM	**£109**

(carriage on ROM-RAM Card £3)

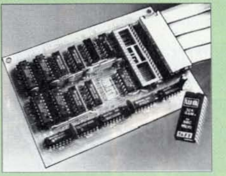
OPTIONAL EXTRAS:

16k plug-in Static RAM kit	£9
16k Dynamic RAM for Upgrade	£13
Battery backup	£3
Read and Write protect switches	£2 each
Complete ROM-RAM board All options installed	£115

P.S.

IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.

- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

BBC SOFTWARE'S Popular Educational Software

Maths with a Story 1 (Disc). 4 primary level maths programs	£20.00
Maths with a Story 2 (Disc). 4 further maths programs.	£20.00
Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs.	£17.00
ECOLOGY O-Level program.	£20.00
POLYMERS O-Level program.	£20.00
Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20.00
ADVANCED TELETEXT SYSTEM	£8.65
PERIOD TABLE SOFTWARE	£20.00
Computers at Work – Primary	£17.35
Introducing Geography 11-17 years	£17.50
Electric Fields 6-14 years	£11.25
Espana Viva – 3 Discs	£19.95
WHITE KNIGHT Chess game	£16.00
A Vous La France	£29.00

More Educational Software

FUN SCHOOL 2 – Red: Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a Letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic.	£12.00
FUN SCHOOL 2 – Green: 6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump	£12.25
FUN SCHOOL 2 – Blue: Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape.	£12.50
FUN SCHOOL 3 – Red	£19.95
FUN SCHOOL 3 – Green	£19.95
FUN SCHOOL 3 – Blue	£19.95
Six French Games – Aimed at pupils in their first year of French, but also useful as revision for more advanced students 11 years+	£26
More French Games – Another 6 games 12 years+	£26
Au Restaurant and Accident de Route 12 years+	£26
Boulogne and Oh-Les – 2 programs for beginners	£26
Letters to French Penpals – 11 years+	£26
French Programs with Henri Beret – The programs in this series present vocabulary, grammar and role-play phrases in the form of animated games. 11-16	£22
Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+	£22
More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+	£22
The Cloze Program – Using context clues to predict is much more than a gap filling exercise. All ages	£26
An Introduction to Electronics – Brings together all the basic electronics required for a GCSE Physics or CDT course. 14-16 years	£26
Computer Control – This is a package of 3 programs simulating control of a greenhouse, a robotic arm & a chemical plant. 14-16 years	£26
The Nuclear Reactor – An interactive, menu driven program for GCSE pupils. Demonstrates & explains nuclear fission & the chain reaction. 14-16 years	£22
PUNCMAN Learning punctuation	
Puncman 1 & 2 for 7 – 13 years	£15
Puncman 3 & 4 for 8 – 14 years	£15
Puncman 5 & 6 for 8 – 15 years	£15
Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+	£18
Letters & Pictures – Introduces phonic skills to Infants 6-8 years	£15
Numbers & Pictures – Early number learning is a great fun (4-6 years)	£15
Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults)	£15
Maps & landscapes No. 1 (9-14 years)	£18
Help Your Child learn Basic Map work No. 2 (9-14 years)	£18
Pirate – Educational Adventure (8-14 years)	£15
Spelling Week by Week (6-14 years)	£18

Archimedes Software

Bookbinder	£43
BUMPER DISC	£14
Bumper Disc 2	£14
Craftshop 1	£26
Craftshop 2	£26
Desktop Stories	£27
DigiSim	£35
Droom	£17
Jiglet	£27
Jigsaw	£28
Numerator	£60
Snippet	£26
Fun School 2A Red (up to 6 years)	£12
Fun School 2A Green (6-8 years)	£14
Fun School 2A Blue (8 years +)	£14
Gate Array Teaching System	£68

Continued→ → → → → → → → →

Computer Concept's ROMS

Communicator	£49
Disc Doctor	£28
Inter BASE	£49
Inter CHART	£25
Inter SHEET	£37
Inter WORD	£36
Mega-3 ROM	£76
Spell Master	£42
TERMI	£25
Wordwise	£24

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

Acorn ROMS

View 3.0 ROM	£45
View Professional	£50
Viewsheet (Acornsoft)	£36
Viewstore	£36
Viewspell with 80 track disc	£25
Viewplot Disc	£20
(Please specify for Master 128 or Compact)	
View-Index	£12
Overview packs 1 & 2	£65
Hi-View	£38

MINI OFFICE II

DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.00
DISC Version for the Compact	£18.00

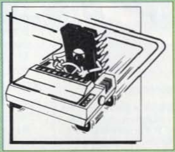
(When ordering please specify for which Micro & 40 or 80 track Disc)

All prices are exclusive of VAT

View Printer Driver Discs

Epson FX & RX 80	£10
Juki & Brother HR	£10

View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

CREDIT CARD
24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

OFFICE MASTER

CentreSoft
Office Master

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

CentreSoft
Office Mate

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

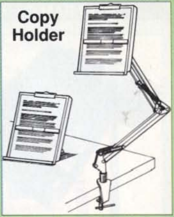
BEEBPLOT – Provides visual representation from Spreadsheet data.

Only £10 (Disc)

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer £14

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

The Epson RX/FX/KAGA Printer Commands Revealed Handbook

Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

ALL PRICES EXCLUDE VAT

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£6.95
15 Hr Wordprocessing BBC/WW & WW+	£6.95
30 Hour BASIC (BBC Micro)	£12.95
1st Word Plus Rel. 2 Manual	£10.00
A3000 Technical Manual	£29.00
Acorn DTP A Guide to	£17.00
Advanced User Guide for BBC	**£10.95**
Archimedes 1st Step – Beginners Guide	£9.95
Archimedes Assembly Language	£14.95
Archimedes BBC Basic Guide	£20
Archimedes DTP Manual	£10.00
Archimedes Operating System	£14.95
Archimedes Risc-Os Programmers Reference Manual	£79.00
Arm Assembly Lang. Prog. Manual	£15
Assembly Language Quick Ref.	£21.95
BASIC 2 – User Guide	£2
Basic V – A Dabhand Guide	£9.95
BBC Basic Guide (Archimedes)	£19.95
BBC Computer Handbook – The Complete	**£14.95**
BBC Micro – Within the	£11.95
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'ACORN TO PC' enables you to change over painlessly. It shows clearly and quicly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

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'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

Price: £15.95 (No VAT)

The Complete BBC Computer User Handbook

If you own a BBC B, B+, Electron, Master 128 or Master Compact, or Archimedes, then this is the book for you. It shows how to get the best from your machine, and how to make it work for you. The general style and level of presentation means that both the expert and beginner alike will feel comfortable with the quality and quantity of the material.

Subjects covered include the general use of computers, hardware design and peripheral devices like printers, disc drives, etc, and Networking. Programming hints and tips and various disciplines for making a better program are discussed in some detail, including debugging of specific errors. Standard programs are covered, such as wordprocessors, spreadsheets, databases, graphics, communications, etc., which brings you neatly on to the subject of using computers in the office or at work – even giving advice on writing and marketing your own programs.

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It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

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Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed.

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Beeb DOS 3.0

(Now reads Archimedes Discs)

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives & read only ADFS and Watford DDFS – not DFS).

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- Legal Bios with built-in Setup routine
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Specifications:

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Aries Notebook I, II and III

These Aries Notebook PCs have energy-efficient 80C88 processor chips running at 10 MHz. Model I is supplied complete with a single 3.5" – 1.44MB floppy drive. The Notebook Model II and III are supplied with a 28mS fast access hard disc, 20MB and 60MB respectively.

In his independent review (Computer Shopper) the reviewer writes, 'The Aries Portable offers exceptional value for money . . . The computer itself is very much what you'd expect a notebook to be, small, with a cramped but very usable keyboard and a respectable backlit display. It is nice to see that you can actually use the extra 384K as EMS memory – there is even a utility that can turn the EMS into a RAM drive for you.'

In his final verdict he writes, 'Overall, the single most outstanding feature has to be the price tag. A notebook PC with hard disc for under £1,000 has no competition at the moment. If you have a small briefcase, weak arms, or just like the concept of a truly portable computer, then this is your man'.

Aries Notebook NB286-12

The New Aries NB286-12 has a faster, high efficiency 80286 processor running at 12MHz.

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Computer Shopper Jan. 1991

Specifications

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• **Drive:**	Internal: 3.5" Floppy Drive (Notebook I) – 2.5 " 20MB Hard Disc (Notebook II & Notebook NB286-12); Notebook III has an internal 2.5" 40MB Hard Drive all 28mS Access speed – Optional external 3.5" or 5.25" floppy drive
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• **Optional Extras:**	External 3.5" Disc Drive – External 5.25" Disc Drive

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8-Bit strikes back

Have you ever wanted to wipe the grin off an Archimedes user's face? Now you can with Paul Carpenter's demo for the BBC Micro

GRAPHICS demos are a very popular form of programming on 16 and 32-bit machines – it's difficult to tell whether they're an art form, programmer's doodling or just plain egotism. The usual point of the exercise is to squeeze as much processing power as possible out of the chip in performing interesting graphical gyrations.

The format of demos is fairly well established – moving star fields, scrolling messages, bouncing balls, although more interesting things are now being done on the Archimedes. However, we've got to start somewhere on the 8-bit BBC Micro, be it ever so humble.

The first task is to decide what the demo will look like. For this one it was decided that the message would scroll inside a sine wave and the star field should appear to be coming towards the viewer out from the centre of the screen to give the best effect.

It's the in thing to use obscure technical sounding names, so we'll call this Interrupt Request, which refers to some complex goings on inside the computer which my demo uses – and it fits with names of Archimedes demos, called after similar things. I have renamed myself with the alias *Tab-Shift Lock-Copy-Man* as it seems usual to name yourself after keys nowadays.

How to use it

The program comes in two parts: One makes the data files and the other makes the finished demo.

The first program – IRQ! – produces the logo, character set data and message. Type it in, check for typing errors with Get it Right! – there's a lot of data – and save it.

Run it, and assuming that it saves the files correctly without ending with an error, you won't need it any more. Keep a copy anyway, just in case.

All the meaty code is contained within the second listing, Demo. Type it in, and check it carefully with the checksums. After saving you can run it to produce your final, 100 per cent pure machine code program which can be run simply with:

```
*RUN D.Demo02
```

Sit back and enjoy it. I am sure that you will not be disappointed – unless you are expecting screen-high text and Bomb the Bass music. In which case, you won't be satisfied by anything the BBC Micro can do anyway.

Sequence	Function
{0xx	Change speed of text. If xx is zero the message will stop moving for a few seconds. Higher numbers give the fastest movement.
{1xx	Change speed of the sine-wave, going left. Smaller numbers give slow waves. Two's complement negative will work. Take away your number from 256 to make the wave go to the right.
{2xx	Change frequency of wave. Over fifty will look silly and zero will give a completely flat wave.
{3xx	Change colour of text. See below.
{4xy	Change logical colours (VDU 19 equivalent). The first digit controls the colour to change, and the second digit is the actual colour, as found on page 224 of the User Guide. Flashing colours will flash at a psychedelic rate.
{end	End of text. This code is used as there is no standard code used by word processors to denote the end of the text. The message will then repeat. The sequence beginning with {3, which changes the colour of the text, does not use zero through to three for the four colours available. Instead it uses it uses the numbers which are used to poke into screen memory to fill a byte with that colour: Black is 00, yellow is 0F, blue is F0 and white is FF. Of course, these colours will be different if you change them with {4 . This method does have the advantage that if you use an undefined value, you will end up with vertical bands of colours which may look effective. Notice that the blue colour aof the backdrop is not changed by the {4 command.

Your own messages

Now that you've seen what the demo can do, you are free to adapt it to display any text you wish. Don't just rewrite the text before first watching mine. That's not just me being egotistic – you won't see the effects that can be achieved.

Type the new message into a word processor with justification off and save it as Message, or change the data lines in IRQ! and run it. In either case, you will also have to rerun the second program for the changed message to be incorporated into D.Demo02.

If you want to spice spice things up with colour and speed changes, you'll be pleased to know that you can change various values by simple control sequences.

These start with the open squiggly bracket, shown as a quarter sign in Mode 7. All sequences consist of one of these signs – { – followed by three hexadecimal digits. The first character controls the function, and the next two are the value.

How it works

The program has a 256-byte look-up table of sine values, which it uses to find the vertical distance between each pixel in the character, displaying the message column by column.

It deletes the old screen as it goes along, as the 6502 isn't fast enough to update it every VSync. It does mean that you get the odd raster shadow on the screen but that can't be helped.

The x-position in the sine wave is held in zero page, and a copy is incremented by the frequency of the wave for each column of the display. This copy is used to index into the sine wave look-up table.

Each time the screen is updated, the x-position index is incremented according to the speed of the sign wave, and so, it sweeps along.

The demo doesn't use a single operating system command. It has to bypass the operating system interrupts to obtain it's speed and does all the IRQ processing itself.

One improvement that could be made on the demo, however, is music. If anybody wishes to add a tune go ahead, but you will have to poke Sheila in the system Via to get any sounds at all.

Alternatively, you could use the OS code, but it may slow down the message. If anybody out there succeeds, drop me a line, but please make the music suitable – Captain Pugwash or Beethoven's Ninth will not really fit.

➤

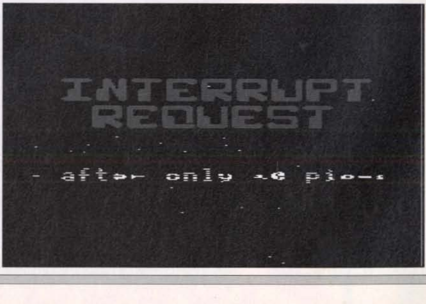
```
10 REM >IRQ!
20 REM by Paul Carpenter
30 REM (c) The Micro User
40 HIMEM=&4000
50 PRINT "Please wait a mo!"
60 FOR T=0 TO 2 STEP 2
70 P%=&B00
80 [OPT T
90 LDA#0:STA&70:LDA#3:STA&72
100 LDA#&58:STA&71
110 LDA#32:STA&C00:.loop
120 LDX#0:LDY#12:LDA#10:JSR&FFF1
130 LDY#7:.loop1 LDA&C01,Y:STA(&70),Y
140 DEY:BPLloop1
150 INC&C00
160 LDA&70:CLC:ADC#8:STA&70:BNEloop
170 INC&71:DEC&72:BNEloop
180 RTS
190 ]NEXT
200 CALL&B00
210 D=&4000:FORE=0 TO 486
230 READA$:A=EVAL("&"+A$)
240 B=A MOD256:C=A DIV256
250 FORT=0 TO C:T?D=B:NEXT
260 D=D+C:NEXT
270 D=&5000:FORT=0 TO 65
290 READ A$:$D=A$:D=D+LENA$
300 NEXT
310 *SA.BackDrp 4000+B00 0000 0000
320 *SA.Message 5000+800 0000 0000
330 *SA.Charset 5800+300 0000 0000
340 END
350 DATA5900,130,270,130,400,4F0,310
360 DATA100,4F0,3C0,100,1C0,2E0,1C0
370 DATAC00,160,6F0,200,310,390,100
380 DATA1C0,6E0,100,130,270,130,400
390 DATA4F0,310,100,4F0,3C0,100,1C0
400 DATA2E0,1C0,400,130,670,100,4F0
410 DATA400,4F0,110,300,1C0,4E0,1C0
420 DATA200,130,670,100,4F0,400,4F0
430 DATA110,300,1C0,6E0,100,130,670
440 DATA100,4F0,400,4F0,110,300,1C0
450 DATA6E0,100,120,670,1100,140,6E0
460 DATA100,130,670,100,4F0,400,4F0
470 DATA110,300,1C0,6E0,100,130,270
480 DATA130,400,4F0,310,100,4F0,3C0
490 DATA100,1C0,2E0,1C0,2B00,310,170
500 DATA4F0,8C0,B00,130,470,2F0,6E0
510 DATA3D0,2F0,370,8E0,800,310,170
520 DATA4F0,8C0,800,870,300,3F0,2E0
530 DATA300,3E0,A00,870,300,5F0,200
540 DATA110,3F0,1E0,1F0,5E0,1C0,200
550 DATA870,300,5F0,200,110,3F0,1E0
560 DATA1F0,5E0,1C0,200,870,300,1C0
570 DATA4E0,800,8E0,870,300,3F0,2E0
580 DATA200,110,3F0,200,5E0,1C0,A00
590 DATA310,170,4F0,8C0,2B00,130,270
600 DATA130,100,7F0,100,3C0,4F0,400
610 DATA1C0,2E0,1C0,100,670,130,100
620 DATA7E0,100,330,310,200,6E0,1C0
630 DATA900,7F0,100,7C0,900,670,130
640 DATA100,3E0,4F0,400,4F0,300,1C0
650 DATA3E0,1C0,100,670,130,100,2F0
660 DATA5E0,100,3F0,170,130,110,200
670 DATA180,1C0,4E0,1C0,100,670,130
680 DATA100,2F0,5E0,100,3F0,170,130
690 DATA110,200,180,1C0,4E0,1C0,100
700 DATA670,130,100,3E0,4F0,400,4F0
710 DATA100,6E0,1C0,100,670,130,100
720 DATA7E0,1900,7F0,100,7C0,4500,410
730 DATA300,4F0,1C0,300,4F0,400,4F0
740 DATA170,400,490,300,4F0,1C0,300
750 DATA4F0,400,4F0,170,400,490,300
760 DATA4F0,1C0,300,4F0,400,4F0,170
770 DATA400,490,300,180,4C0,B00,110
780 DATA430,400,490,300,4F0,1C0,300
790 DATA4F0,400,4F0,170,400,490,300
800 DATA4F0,1C0,300,4F0,400,4F0,170
810 DATA400,290,280,300,4F0,400,4F0
820 DATA170,300,4F0,500,280,5A00,810
830 DATA5C0,3F0,500,3F0,430,170,3F0
840 DATA790,110,5C0,3F0,500,3F0,130
850 DATA400,380,810,5C0,3F0,600,280
860 DATA830,890,5C0,3F0,600,280,830
870 DATA890,5C0,3F0,500,3F0,130,400
880 DATA380,710,100,5C0,3F0,500,3F0
890 DATA130,400,3F0,600,280,500,110
900 DATA230,570,3F0,6800,810,CF0,1B0
910 DATA190,380,1C0,1E0,4F0,170,410
920 DATA490,8F0,580,3F0,400,130,3F0
930 DATA510,390,8F0,580,3F0,430,100
940 DATA3F0,490,110,3D0,8F0,580,3F0
950 DATA530,3F0,890,8F0,580,3F0,400
960 DATA130,3F0,400,110,390,300,1C0
970 DATA1E0,3F0,500,3F0,170,430,3F0
980 DATA880,830,8F0,7000,1F0,700,180
990 DATA700,130,F00,1F0,700,1F0,700
1000 DATA1F0,F00,1F0,700,1F0,700,1F0
1010 DATA700,1C0,700,1F0,700,1F0,700
1020 DATA1F0,F00,1F0,700,1F0,700,1F0
1030 DATAF00,1F0,700,1F0,700,1F0,F00
1040 DATA130,700,1F0,24000
1050 DATA "{120{204{426                "
1060 DATA "                     {3FFWel"
1070 DATA "come to the{206{3F0{000  I"
1080 DATA "NTE{002RRUPT REQUEST{3FF D"
1090 DATA "emo 2.{108{001 {205Hot on "
1100 DATA "the heels of {210IRQ Demo "
1110 DATA "1{205{110{421 comes this p"
1120 DATA "roduction, yet another pie"
1130 DATA "ce of{208{3F0 hot{3FF{205 "
1140 DATA "programming after only {13"
1150 DATA "020 picoseconds of {422 pr"
1160 DATA "ogramming after only 10 pi"
1170 DATA "coseconds lazing about thi"
1180 DATA "nking what to do (honest!)"
1190 DATA " while jogging around the "
1200 DATA "square writing the mega-fa"
1210 DATA "st screen update code. (I "
1220 DATA "think not!) by me,{10A the"
1230 DATA " wonderful {3F0TAB-SHIFT L"
1240 DATA "OCK-COPY-MAN {3FF to show "
1250 DATA "the ultimate coolness of e"
1260 DATA "ight bit.{114{002 We have "
1270 DATA "8-bits of parallel process"
1280 DATA "ing SIMULTANEOUSLY, and th"
1290 DATA "e latest cool dud, the 65S"
1300 DATA "C12{000 and we ARE MOVING."
1310 DATA " Fasten your seatbelts, we"
1320 DATA " shall be cruising at appr"
1330 DATA "oximately 2 megahertz and "
1340 DATA "that is fast (honest!). Th"
1350 DATA "is message is constantly r"
1360 DATA "eplotted {201{110{000 {30F"
1370 DATA "*EVERY VSYNC or so*  {3FF{"
1380 DATA "206{102 Bit obvious really"
1390 DATA ". {110How do you like the "
1400 DATA "yeuck {210sine wave, very "
1410 DATA "hoogoish, don't you think?"
1420 DATA " {204{004(half 'inched fro"
1430 DATA "m a Medes Demo, but don't "
1440 DATA "tell anybody){002. Yo to m"
1450 DATA "y friends (insults later) "
1460 DATA "and nothing for anyone els"
1470 DATA "e I know.{001 Well, what c"
1480 DATA "an I say now? You know com"
1490 DATA "puters find it hard to be "
1500 DATA "amusing. To me,it comes na"
1510 DATA "turally.{208{118 Its about"
1520 DATA " eight on a Tuesday aftern"
1530 DATA "oon when this was written "
1540 DATA "on View. So what can we sa"
1550 DATA "y now? Oh yes, insults tim"
1560 DATA "e. Time for some parasites"
1570 DATA " .to get their names rollin"
1580 DATA "g on a sine-wave (yippee!)"
1590 DATA ". All demos MUST have a cr"
1600 DATA "edits list. Hiya to Fredd "
1610 DATA "(beat this on your 32-bit."
1620 DATA " 8-bit is wicked), yo to D"
1630 DATA "erry the Poos. Hi Rich B ("
1640 DATA "can't think of a derogator"
1650 DATA "y comment), Nic Rich (Ghos"
1660 DATA "tbuster), Cabbage, Dunc (B"
1670 DATA "ombs!), Mad Matt and all t"
1680 DATA "he crew who had nothing to"
1690 DATA " do with this demo whatsoe"
1700 DATA "ver. {end "
```

SUBSCRIBE NOW!

If you prefer to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*.

Get it right ✓

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 2D69 9
  50 = 1ED8 9
  60 = 2086 E
  70 = E1D6 9
  80 = 2C05 6
  90 =  EC0 9
 100 = E17E B
 110 = 7930 0
 120 = 5919 C
 130 = A9CC E
 140 = B1FF D
 150 = 84C5 E
 160 = 44F5 E
 170 = 6419 0
 180 = 9843 C
 190 = 5460 F
 200 = AABB 0
 210 = 65F9 2
 230 = 30A7 0
 240 = 8CE5 9
 250 =  746 2
 260 = 4EFA A
 270 = 5427 1
 290 = 2B5D B
 300 = 2C83 4
 310 = 6767 1
 320 = 4B58 F
 330 = 641D 0
 340 = FD2E 2
 350 = C76A 9
 360 = 2526 5
 370 = 50A4 7
 380 = E847 1
 390 = C002 2
 400 = F271 4
 410 = 29C7 B
 420 = 5179 0
 430 = C160 F
 440 = 12AD 2
 450 = 6CBC 7
 460 = 6ED3 5
 470 = 1DA0 7
 480 = DC3E D
 490 = DF4A 2
 500 = EA7B 3
 510 = AC3A 8
 520 = 6233 D
 530 = B76F E
 540 =  68D 3
 550 = 61FB 8
 560 = F272 3
 570 = CE41 1
 580 = F938 A
 590 = 52B3 4
 600 = 6FE7 C
 610 = A793 4
 620 = C141 4
 630 = 9115 B
 640 = 421B F
 650 = C20D B
 660 = C60C 4
 670 = 93C6 C
 680 = F31D 1
 690 = 175D 3
 700 =   F5 7
 710 = E3BB 9
 720 = 77A6 6
 730 = 16EF C
 740 = 8900 A
 750 = 97E5 D
 760 = 4DBE B
 770 = 5A8C 4
 780 = 5838 7
 790 = 97E5 A
 800 = 4DBE 7
 810 =   5F E
 820 = 1E02 2
 830 = 643B F
 840 = A4C8 3
 850 = CE14 A
 860 = A622 2
 870 = F4CC F
 880 = 5A09 4
 890 = EAF8 2
 900 = 41BB F
 910 = 33AE 2
 920 = DF93 9
 930 = 7E14 4
 940 = E4F2 6
 950 = E7E1 6
 960 =  208 6
 970 = B3BB B
 980 = D04A E
 990 = 9590 5
1000 = C5ED 1
1010 = D8AD 2
1020 = C5ED 0
1030 = 2B8C F
1040 = D7C0 B
1050 = 180F 7
1060 = 5F14 C
1070 = 9756 6
1080 = D404 D
1090 = 5828 C
1100 = FAFC 1
1110 = 4AC3 5
1120 = 30A0 0
1130 = 3DCE 4
1140 = 828E D
1150 = 16E6 1
1160 = 2F69 1
1170 = 7B38 0
1180 = EAEB 8
1190 = 461E 5
1200 = 6844 3
1210 = 223C 3
1220 = F82B 2
1230 = A849 3
1240 = E31C 8
1250 = E1DC F
1260 = F6A4 3
1270 = EA23 1
1280 = 3D1F 7
1290 = AAC3 A
1300 = A486 8
1310 = F39E 3
1320 = AD47 2
1330 = DA61 A
1340 = C76F 9
1350 =  550 2
1360 = E73B F
1370 =  F5A B
1380 = B558 B
1390 = A12B 2
1400 = 3761 2
1410 = B972 3
1420 = 9543 D
1430 = E3AE 3
1440 = F59B A
1450 = 7079 9
1460 = FF53 F
1470 = 2B38 5
1480 = 7695 5
1490 = AE81 9
1500 = E05A E
1510 = F915 F
1520 = AEC3 D
1530 = 1B61 D
1540 =  CF2 4
1550 =  C8A C
1560 = F735 F
1570 = 99A5 2
1580 = E381 4
1590 = 3F81 6
1600 = 7BBA 2
1610 = A4A3 4
1620 = 7068 6
1630 = 7173 3
1640 = 27CB A
1650 = 3785 B
1660 = 397A 0
1670 =  DC5 7
1680 = 1477 5
1690 = D15C D
1700 = CEB8 5
```



```
10 REM >Demo
20 REM by Paul Carpenter
30 REM (c) The Micro User
40 :
50 FORT=4TO6STEP2
60 P%=&1FA:O%=&38FA
70 [OPT T
80 PHA:ADC&6C:JMP(DemoIII+&2C00)
90 OPT FNw(spare):OPT FNw(brk)
100 OPT FNw(irq1)
110 OPT FNwaste
120 .h OPT FNd(&9081898A)
130 .index
140 OPT FNd(&10204080)
150 OPT FNd(&1020408)
160 .scrlow
170 OPT FNd(&03020100)
180 OPT FNd(&07060504)
190 OPT FNd(&43424140)
200 OPT FNd(&47464544)
210 .scrhigh
220 OPT FNd(&71717171)
230 OPT FNd(&71717171)
240 OPT FNd(&72727272)
250 OPT FNd(&72727272)
260 OPT FNd(&59595959)
270 OPT FNd(&59595959)
280 .zpg
290 OPT FNd(&400)
300 OPT FNd(&40000000)
310 OPT FNd(&11000)
320 OPT FNd(0)
330 OPT FNd(&88030000)
340 .crtc
350 OPT FNd(&2431283F)
360 OPT FNd(&22200026)
370 OPT FNd(&08200701)
380 OPT FNw(11)
390 .spare
400 RTS
410 .brk PLP:NOP:NOP:JMPlot
420 .DemoIII OPT FNd(genesis+&2C00)
430 .plus JSRrnd
440 .and AND#1:BNEzero
450 LDA#&FF:RTS
460 .rnd EOR#&AA
470 ASLA:EOR&FE64:ROLA:ROLA
480 EOR&60:EOR&FE64:RTS
490 .zero LDA#0:RTS
500 .hex
510 SEC:SBC#55:BMIjig:CMP#10:BCSyep
520 .jig ADC#7:.yep RTS
530 .genesis
540 LDA#&FF:STA&92:LDA#&30:STA&93
550 LDA#4:STA&61
560 ASLA:STA&FE34:LDA&F4:STA&FE30
570 LDA#&7F:STA&FE6E
580 LDA#&A0:STA&FE6E
590 LDX#1:STX&FE65
600 LDA#&7D:STA&FE4E
610 DEX:STX&FE6B:STX&FE64:STX&6E
620 STX&6D
630 LDA#&40:STA&FE6B
640 LDY#7:SEI
660 .loop LDA&2AF0,X:STA&1100,X
670 LDA&2BF0,X:STA&1200,X
680 LDA&2CF0,X:STA&1300,X:DEX:BNEloop
690 .loop LDA&2E00,X:STA&200,X
700 DEX:BNEloop:INCloop+&2C02
710 INCloop+&2C05:DEY:BNEloop
720 LDY#&28:TXA:.loop STA&5800,X
730 DEX:BNEloop
740 INCloop+&2C02:DEY:BNEloop
750 LDX#13:.loop LDAcrtc,X
760 STX&FE00:STA&FE01:DEX:BPLloop
770 LDX#&0F:.loop
780 LDAzpg,X:STA&80,X:DEX:BPLloop
790 LDA#&07:JSRcol4
800 LDA#&24:JSRcol4
810 LDA#&83:JSRcol4
820 LDA#&A0:JSRcol4
830 CLI
840 INX:.newstar
850 JSRrnd:JSRand:STA&3F00,X
860 JSRrnd:LSRA:PHP
870 JSRrnd:JSRand:PLP:ASLA:STA&3F01,X
880 LDA#&14:STA&3F02,X
890 LDA#&80:STA&3F03,X
900 JSRrnd:STA&3F04,X
910 JSRrnd:STA&3F05,X
920 LDA#&A0:STA&3F06,X
930 LDA#&6C:STA&3F07,X
940 LDA#0:STA&3F08,X
950 JSRrnd:STA&3F09,X
960 JSRrnd:STA&3F0A,X:.zapo
970 TXA:CLC:ADC#11:TAX
980 CPX#&FD:BNEnewstar
990 LDA#&60:STAzapo
1000 .lot
1010 LDA&93:BEQoil:DEC&93:BNEst
1020 LDA#&60:STApoke:JSRstars
1030 LDX#0:STX&94:LDY#10:.loop
1040 LDA&3500,X
1050 STA&6300,X:DEX:BNEloop
1060 INCloop+2:INCloop+5
1070 DEY:BNEloop
1080 LDA#&A2:STApoke:TYA:BEQoil
1090 .st LDX#2:.loop1 LDA&60
1100 .loop CMP&60:BEQloop
1110 DEX:BNEloop1
1120 JMPstars:.oil
1130 LDY#7:.loop STA&7100,Y
1140 DEY:BPLloop
1150 LDA&81:STA&8D
1160 LDA&92:STA&90
1170 LDA&8A:BNEfg:DEC&8C:BNEfg
1180 LDA&8B:STA&8A:.fg
1190 LDA&88:CLC:ADC&8A:CMP#8:BCCg
1200 SBC#8
1210 INC&86:BNEg:INC&87:.g
1220 STA&88:STA&85
1230 LDA&86:STA&83:LDA&87:STA&84
1240 LDA#40:STA&78
1250 LDY#0:STY&76:STY&77
1260 LDA#2:STA&7B
1270 .well LDY#0:LDA(&83),Y:CMP#&0D
1280 BEQis32:CMP#&7B:BEQFX:JMPnotFX
1290 .FX
1300 LDA&8A:STA&6F
1310 INY:LDA(&83),Y:CMP#&65:BEQend
1320 AND#7:STA&91
1330 TAX:LDAh,X:TAX:INY:LDA(&83),Y
1340 JSRhex:ASLA:ASLA:ASLA:ASLA
1350 STA&7F:INY:LDA(&83),Y:JSRhex
1360 ORA&7F:LDY&91:CPY#4:BCSgood
1370 STA0,X
1380 CPY#3:BNEfgo:STA&92:.fgo
1390 CPX#&81:BNEbon:STA&8D
1400 LDA&8E:STA&80:STA&82:.bon
1410 LDA&8C:BNEjkl:LDA#&70:STA&8C
1420 LDA&6F:STA&8B:.jkl
1430 LDA&83:CLC:ADC#4:STA&83:STA&86
1440 LDA&84:ADC#0:STA&84:STA&87
1450 JMPwell
1460 .is32 LDA#32:BNEnotFX
1470 .end LDA#0:STA&86:STA&83
1480 LDA#&40:STA&87:STA&84:BEQgood
1490 JMPwell
1500 .good
1510 STA&7F:AND#&F0:CMP#&20:BEQfrt
1520 LDA&7F:JSRusercol4:JMPbon
1530 .frt LDA&7F:AND#15:STA&61:JMPbon
1540 .notFX ASLA:ROL&7B
1550 ASLA:ROL&7B:ASLA:ROL&7B:STA&7A
1560 .loop
1570 LDA#&88:STA&79:.loop1
1580 LDA#0:STA&75
1590 LDX&80:LDAsine,X:ASLA:ROL&75
1600 ASLA:ROL&75:STA&74
1610 LDA#0:SEC:SBC&74:STA&72
1620 LDA#2:SBC&75:ASL&72:ROLA
1630 ASL&72:ROLA:STA&73
1640 .column
1650 LDX&85:CPX#8:BCCok
1660 LDA#0:STA&85
1670 LDA#2:STA&7B
1680 INC&83:BNEok2:INC&84:.ok2
1690 LDY#0:LDA(&83),Y:CMP#&0D:BEQret
1700 CMP#&7B:BNEnFX
1710 INY:LDA(&83),Y:CMP#&32:BEQdftg
1720 CMP#&65:BEQres
1730 CMP#&33:BNEj:.dftg TAX
1740 INY:LDA(&83),Y:JSRhex:ASLA:ASLA
1750 ASLA:ASLA:STA&7F:INY:LDA(&83),Y
1760 JSRhex:ORA&7F:CPX#&33
1770 BEQghia:STA&8D:LDA&8E
1780 STA&80:LDA&8E:SEC:SBC&8D:STA&8E
1790 .j
1800 LDA&83:CLC:ADC#4:STA&83
1810 LDA&84:ADC#0:STA&84
1820 JMPok2
1830 .res LDA#0:STA&83:LDA#&40:STA&84
1840 JMPok2
1850 .ghia STA&90:JMPj
1860 .ret LDA#32
1870 .nFX ASLA:ROL&7B
1880 ASLA:ROL&7B:ASLA:ROL&7B:STA&7A
1890 .ok
1900 LDX&85
1910 LDAindex,X:STA&7C
1920 LDY#0:LDX&73:.again
1930 LDAscrlow,X:CLC:ADC&76:STA&70
1940 LDAscrhigh,X:ADC&77:STA&71
1950 LDA(&7A),Y:AND&7C:BEQnot:LDA&79
1960 .not LDX#0:AND&90:ORA(&70,X)
1970 STA(&70,X)
1980 LDA&72:CLC:ADC&74:STA&72
1990 LDA&73:ADC&75:STA&73:TAX
2000 INY:CPY#8:BNEagain
2010 LDA&85:CLC:ADC#1:STA&85
2020 LDA&80:CLC:ADC&8D:STA&80
2030 LSR&79:BCCgoloop1
2040 LDA&76:CLC:ADC#8:STA&76:BNEd
2050 INC&77:.d
2060 LDA&76:STA&70:LDA&77:CLC:ADC#&71
2070 STA&71:LDY#7:LDA#0:.loopy
2080 STA(&70),Y:DEY:BPLloopy
2090 LDA&70:CLC:ADC#&40:STA&70
2100 LDA&71:ADC#1:STA&71
2110 LDY#7:LDA#0:.loopy
2120 STA(&70),Y:DEY:BPLloopy
2130 DEC&78:BEQk:JMPloop
2140 .goloop1 JMPloop1:.k
2150 LDA&82:CLC:ADC&89:STA&80:STA&82
2160 LDA&94:BEQpoke
2170 .stars
2180 LDA&60:.loop CMP&60:BEQloop
2190 LDX#&F2:.loop
2200 LDA&3F06,X:STA&70
2210 LDA&3F07,X:STA&71
2220 LDY#0:LDA&3F08,X:STA(&70),Y
2230 TXA:SEC:SBC#11:TAX:BCSloop
2240 .poke
2250 LDX#0:.loop
2260 LDA&3F09,X:CLC:ADC&3F04,X
2270 STA&3F04,X:LDA&3F00,X
2280 ADC&3F02,X:STA&3F02,X:STA&70
2290 CMP#40:BCCew
2300 JMPnew:.ew
2310 LDA&3F0A,X:CLC:ADC&3F05,X
2320 STA&3F05,X:LDA&3F01,X
2330 ADC&3F03,X:STA&3F03,X:STA&71
2340 RORA:EOR&3F01,X:BMInew
2350 LDA&70:ASLA:ASLA:ASLA:STA&70
2360 LDA#0:ROLA:STA&74
2370 LDA&71:AND#7:ORA&70:STA&70
2380 LDA&71:LSRA:LSRA:LSRA
2390 STA&73
2400 LDY#0:STY&72:LSRA:ROR&72
2410 LSRA:ROR&72
2420 ADC&73:ADC&74:STA&73
2430 LDA&70:CLC:ADC&72:STA&72
2440 STA&3F06,X
2450 LDA&73:ADC#&58:STA&73:STA&3F07,X
2460 LDY#0:LDA(&72),Y:STA&3F08,X:PHA
2470 LDA&3F04,X:ASLA:ROLA:ROLA:AND#3
2480 TAY:PLA:ANDpen1,Y:BNEkol
2490 LDApen,Y:LDY#0:ORA(&72),Y
2500 STA(&72),Y
2510 .kol TXA:CLC:ADC#11:TAX:CPX#&FD
2520 BEQglot:JMPloop:.glot LDA#&FF
2530 STA&94:JMPlot
2540 .new JSRnewstar:JMPkol
2550 .pen OPT FNd(&1020408)
2560 .pen1 OPT FNd(&11224488)
2570 .irq1
2580 LDA&FC:PHA
2590 LDA&FE4D:BPLnotsys
2600 DEC&60:LDA&FE41:LDA#&83:JSRcol4
2610 LDA#0:STA&FE68
2620 LDA#&2C:STA&FE69
2630 DEC&6D:BPLnotsys:LDA#3:STA&6D
2640 LDA&6E:EOR#1:STA&6E:ORA#&C4
2650 STA&FE20:.notsys
2660 LDA&FE6D:BMItimeout
2670 PLA:RTI
2680 .timeout LDA&FE68
2690 LDA&61:EOR#&87:JSRcol4:PLA:RTI
2700 RTS
2710 .usercol4
2720 PHA:EOR#7:AND#15:STA&00
2730 PLA:LSRA:LSRA:LSRA:LSRA:TAX
2740 LDAaid,X:ORA&00
2750 .col4
2760 STA&FE21:EOR#&10:STA&FE21
2770 EOR#&40:STA&FE21:EOR#&10:STA&FE21
2780 RTS
2790 .aid OPT FNd(&A0802000)
2800 .sine
2810 ]NEXT
2820 FORT=&3700 TO &37FF
2830 T?sine=(SIN(T/128*PI)*50)+77
2840 NEXT
2850 *L.BackDrp 4000
2860 *L.Message 4B00
2870 *L.Charset 35F0
2880 *SA."D.Demo02"35F0+1D00 2DFA 2AF0
2890 END
2900 DEF FNb(A)
2910 ?O%=A:O%=O%+1:P%=P%+1:=T
2920 DEF FNd(A)
2930 !O%=A:O%=O%+4:P%=P%+4:=T
2940 DEF FNw(A)
2950 !O%=A:O%=O%+2:P%=P%+2:=T
2960 DEF FNwaste
2970 FORA=0 TO 10 STEP 2
2980 A!O%=spare:NEXT
2990 O%=O%+12:P%=P%+12:=T
```

➤

INTERRUPT
REQUEST
- after only

Get it right ✓

```
➤
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 9719 9
  50 = F00D 7
  60 = C28E 4
  70 = 2C05 5
  80 = 61B0 3
  90 = 86C3 A
 100 = 6D8F 4
 110 = 4908 A
 120 = D50A 6
 130 = B368 5
 140 = 1BB5 4
 150 = BE51 4
 160 = 747F D
 170 = 8553 E
 180 = 8AAA 2
 190 = 8DBC 8
 200 = 8245 5
 210 = D79F C
 220 = BD8F 5
 230 = BD8F 0
 240 = 7595 0
 250 = 7595 9
 260 = 2E1A 0
 270 = 2E1A 0
 280 = 9EC5 E
 290 = A64E 0
 300 = 2C3D 6
 310 = 9AAE 8
 320 = BD48 A

 330 = 4917 B
 340 = 2B22 A
 350 = DE15 D
 360 = 5D36 D
 370 = ACF7 3
 380 = DC5F 8
 390 = FAE9 E
 400 = 9843 7
 410 = F22E 6
 420 = C00A F
 430 = 9E9B 7
 440 = C15F 2
 450 = 471A 0
 460 = A187 C
 470 = 9ADC 9
 480 = 7140 6
 490 = B557 8
 500 = AC9E 9
 510 = 5291 3
 520 = BCEA 8
 530 = 1EC3 C
 540 = 8DF5 C
 550 = 2D74 6
 560 = 6CD2 8
 570 = 7D47 0
 580 = 9B1F 1
 590 = 7E4A A
 600 = C5AF 1
 610 = 17A1 1.
 620 = 41AD 3
 630 = D964 7
 640 = 2AF5 3
 660 = FA47 8

 670 = 9FEB A
 680 = B59D 9
 690 = F5A7 A
 700 = 8C3F 7
 710 = D45D 5
 720 = 7925 3
 730 = F63A E
 740 = 1E55 9
 750 = CDB1 0
 760 = 768F 4
 770 = D2DD C
 780 = 4A42 D
 790 = DCD7 9
 800 = 2F19 1
 810 =  A73 B
 820 = DDB8 B
 830 = D5B1 1
 840 = DC60 D
 850 = A556 F
 860 = 7568 B
 870 = 3F9E 9
 880 = 412F 3
 890 = 35F2 E
 900 = AF47 0
 910 = 9877 D

 920 = F137 4
 930 = EC2C 9
 940 = E61C F
 950 = ED16 7
 960 = F387 E
 970 = EB25 7
 980 = 51A5 8
 990 = 7EEC 9
1000 = 5E19 5
1010 = 4387 7
1020 = 7113 0
1030 = 4A7D D
1040 = 976D 7
1050 = FCC6 F
1060 = 1445 1
1070 = 1D19 C
1080 =  710 6
1090 = D291 3
1100 = 713E 4
1110 = 93AB 2
1120 = 8A94 C
1130 = DF16 C
1140 = 2F42 9
1150 = AEDE 9
1160 = 80AA 8

1170 = 995A 4
1180 = F089 1
1190 = CDE3 4
1200 = D807 F
1210 = 6DCE 6
1220 = 79D7 D
1230 = D172 D
1240 = 3148 E
1250 = FEF5 0
1260 = D07A A
1270 = C6B9 7
1280 = 4ADC A
1290 = E150 E
1300 = 1D9F 1
1310 = B342 A
1320 = D2FA C
1330 = 5DC2 B
1340 = 5B6A C
1350 =  9A2 3
1360 =  197 1
1370 = 67BB 6
1380 = 2BD1 2
1390 = 3000 E
1400 = 56D5 2
1410 = A321 F

1420 = D078 5
1430 = 1544 0
1440 = 66F0 D
1450 = 9F6D F
1460 = 1B22 C
1470 = 260F D
1480 = 29AD 7
1490 = 9F6D 7
1500 = 4F8F 3
1510 = CFD2 B
1520 = D4E8 1
1530 = 77BB 8
1540 = 2994 E
1550 = 10F9 4
1560 =  325 7
1570 = DBC6 B
1580 = 51AC F
1590 = E47F A
1600 = 73EA F
1610 = 4F9D E
1620 = E7F7 1
1630 = 24DE 9
1640 = 64A5 9
1650 = B6B7 0
1660 = 4192 7
1670 = D07A 5
1680 = DEE2 4
1690 = C2AE B
1700 = 42D2 7
1710 = 6644 6
1720 = 13F2 0
1730 = 3F15 2
1740 = F3A4 7

1750 = B171 3
1760 = 52E6 0
1770 = BDD7 A
1780 = A603 6
1790 = E805 E
1800 = C258 1
1810 = 8E12 6
1820 = DFA0 3
1830 = 382D 5
1840 = DFA0 5
1850 = 7143 E
1860 = DE81 F
1870 = 8C80 B
1880 = 10F9 2
1890 = 5B1E A
1900 = D7C9 0
1910 = 2A05 5
1920 = 5A30 C
1930 = 70F9 E
1940 = C1C0 1
1950 = 809C D
1960 = 5393 B
1970 = B513 9
1980 = C646 1
1990 = A744 2
2000 = 6A97 7
2010 = EAC4 A
2020 = 47DD E
2030 = 5FD5 6
2040 = 9DE9 2
2050 = 5512 E
2060 = AC06 B
2070 = 8C5F D

2080 =  45A F
2090 = B5DD 1
2100 = 504C 4
2110 = 679C 7
2120 =  45A 2
2130 = 7389 7
2140 = CBE3 5
2150 = B3C0 1
2160 = E5EE 9
2170 = 42EF F
2180 = BC93 8
2190 = A7BD 9
2200 = 6891 6
2210 = 17F5 1
2220 = C9C4 C
2230 = 8777 D
2240 = D9E0 B
2250 =  DD0 4
2260 = 373B 8
2270 = 70F3 E
2280 = 3160 C
2290 = 7CF5 D
2300 = E8A6 4
2310 =  DDB 8
2320 = 3CA2 A
2330 = 9BF2 C
2340 = B83A E
2350 = 19F6 A
2360 = DBB3 6
2370 =  8CB E
2380 = F107 9
2390 = 943C C
2400 = FE10 D

2410 = 98BC 2
2420 = 54E0 3
2430 = EA92 3
2440 = 4740 7
2450 = 8C64 1
2460 = 31CB B
2470 = FDF6 5
2480 = F54A 5
2490 = 6E95 3
2500 =  981 F
2510 = BE96 2
2520 = 2781 9
2530 =  5B1 6
2540 = 85ED C
2550 = 5475 F
2560 = 147C 2
2570 = C6CB 5
2580 = F6C5 D
2590 = 67A8 B
2600 = 5947 3
2610 = BD49 A
2620 = 8922 5
2630 = 8CF7 7
2640 = 8B8B 3
2650 =  B9C 4
2660 = C74E 9
2670 = 5F27 8
2680 = 939C 5
2690 = AA2E 6
2700 = 9843 A

2710 = 7802 4
2720 = 9C2C 3
2730 = 3F62 2
2740 = 8E39 0
2750 = 8AD8 A
2760 = 121C E
2770 = 31AE 6
2780 = 9843 3
2790 = 530F F
2800 =  F69 6
2810 = 5460 C
2820 =   49 E
2830 = 3BF8 E
2840 = 2C83 1
2850 = C8C6 9
2860 = F612 7
2870 = 4FA4 0
2880 = B1B6 3
2890 = FD2E 1
2900 = 2D65 C
2910 = 239F B
2920 =  AFC 6
2930 = CB1B 9
2940 = 8A87 9
2950 = E7BC 0
2960 = C50C C
2970 = 15D9 2
2980 = FB8C E
2990 = 81AA C
```

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Reviewed in Risc User, October 1990

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A Dabhand Guide
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Mini Office
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More than a manual, the guide assumes nothing. Beginning with the first sentences typed into the editor, you are led through al aspects of using the system, up to the most advanced techniques.

All the examples are also on an accompanying disc which even includes a very useful routine to print out large spreadsheets sideways.

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9 Classic card & board games No. 1
For the BBC Micro and Electron
THE MICRO USER
SPECIAL

PLEASE USE THE ORDER FORM ON PAGE 106

Users come first

Peter Dagg concludes his look at the art of creating usable programs

IN my first article we saw that when writing comprehensible and usable software for non-micro users you should start by looking carefully at the needs of your potential users and constructing a *user model* they can understand.

Remember that the essential function of such a model is to provide a phony world that the user understands and can happily manipulate, by replacing invisible, abstract and unfamiliar concepts with more visible, concrete and real ones.

This will free the user from having to memorise and type in bizarre commands and, instead, lets him recognise and select what he wants with mouse, keyboard or other input device.

After putting together your user model, which might consist of no more than a flowchart plus some guidelines and ideas, you should have a fairly clear idea of what you want your prototype user interface to be like. It is only at this stage that you should start on the actual programming, so let's take a look at some simple rules that will help you turn your model into actual software:

First, and always, **keep it simple**. Your user just wants to be able to do his job and nothing more. Don't be tempted to give him extra features he doesn't need.

Graphs showing correlations between income brackets and mean milk consumption might impress our example milkman at first.

But if they don't give tangible and lasting benefits they will just clutter and confuse.

You should also try to simplify things by merging commands to reduce the number of choices available at any one moment. A few powerful, far-ranging commands are easier to cope with than lots of little ones.

For our example, perhaps instead of having *Search* for addresses and *Find* for outstanding bills, we could just have a more flexible *Find* command covering both, or more. Naturally we use the word *Find* because it communicates the concepts better than *Search*.

Be consistent. Commands should have the same effects in different contexts: Move, Delete, Copy and Help are obvious choices for universal applications. Make sure they do the same thing, for example, Delete always deletes the relevant item, always asks for confirmation, always permits the data to be recovered perhaps. But never have exceptions. This means that any experience the user gains in one area can be applied elsewhere.

Consistency is probably the most difficult attributes to achieve. In our example the consistency of a *Find* command may clash with the consistency of the model.

You could *find* a customer record by looking in the log book, but you couldn't *Find* all the customers who've always had nine pints of milk per week so easily. This may seem trivial but beware of such trivia breaking the illusion you're working so hard to create.

Pay attention to detail. Tiny inconsistencies are often the cause of immense confusion and a breakdown in understanding. It could be very disconcerting to users, for example, if they suddenly get a mode change message flashing up when they think they're just turning the page of the log book.

Another detail is ensuring that all key presses provide some form of response, even if it's just something that indicates the key has no effect.

Audio clues are very useful in this instance, a high, brief beep for allowable presses and a longer low-pitched one for incorrect key presses will add a lot.

The reason is quite simple: If a user presses a key and nothing seems to happen they will press it again, thinking they're being ignored – and nobody likes that. Just imagine the disasters that could stack up with all those key presses being queued up in the buffer.

Common faults

Don't get carried away with the power of the machine and try to cram every last feature into your program, the result will be one that is unwieldy, confusing and ultimately of no use to anyone.

Adding a battery of data analysis functions to the milk round program might be an interesting challenge, but is there any real point? Be strict about leaving out things you don't need.

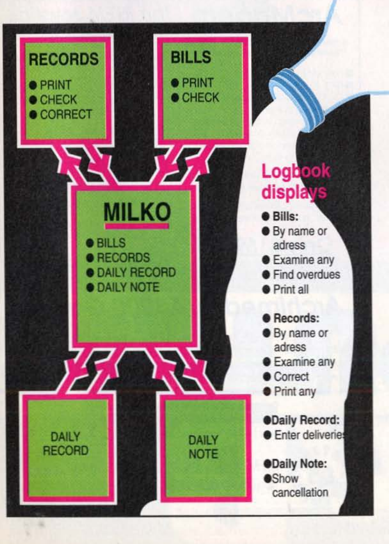
Don't be tempted into making the program give the user any technical details. Remember, all he wants to do is his job, the internal workings of the system should, as far as possible, be invisible.

Another pitfall is making your instructions concise in the belief that this makes them simpler. It doesn't. Nearly all professional software nowadays has two manuals, a beginner's tutorial that explains everything clearly with lots of examples, and frequently repeats information. And the reference guide for people who know what they're doing and just need to look something up.

The worst mistake you can make is to ignore the opinions and feedback of your users. Being the go-between for the cold silicon logic of the micro and the woolly superstitions of users is an artform at best, and failing to pay attention to either in a process of trying and testing, and trying and testing till you get it right, will always leave your efforts below par.

Finally, plan right from the start to throw away your prototype program. You will anyway. Planning for it may give your imagination the freedom to try out more radical ideas and will keep you open to new possibilities as you work. It also means that you won't get so upset about dumping your masterpiece.

Writing software for other people is never easy. But with effort and imagination these ideas should help you with the key to understanding and usability: Put the user before the machine.



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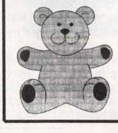

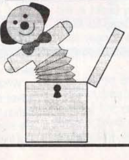

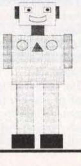

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Offbeat oscillators

Round and round and back and forth with Mike Cook

WE saw last time that a strange attractor is the path formed by repeatedly iterating some mathematical process which can be used to mirror natural phenomena. In many systems the strange attractor can be simply a closed loop, but complex behaviour can occur where you have a forced oscillator.

You can think of an oscillator as having a natural frequency, like the period of a pendulum.

Now if you input energy into a system at a frequency slightly different from its natural frequency then very complex behaviour can arise. What you are doing is trying to force an oscillator to go at a frequency that is not natural for it.

One such forced oscillator is the Duffing oscillator, which is what we will look at this month.

It is a forced oscillator with a cubic term, the program to produce it is shown in the listing, it will run on any Acorn machine. The oscillator is controlled by:

$$X_{n+1} = X_n + DY_n$$
$$Y_{n+1} = Y_n - ((AX^3 + CX + BY) + F \cos (Z_n)) D$$
$$Z_{n+1} = Z_n + D$$

The program allows you to input four of the constants in the polynomial expression. As the value of D controls the spacing between the points on the strange attractor, it is left fixed.

There is a problem, however, concerning the scale of the graphics. With so many different parameter combinations, the resulting attractor can vary greatly in size. The solution is to start with some form of arbitrary scale and let the process run for some time.

All the time it is running we make a note of the largest coordinate generated. Then when the spacebar is pressed we wipe the screen and rescale the new drawing to accommodate the largest values generated. The program shown does not reset the initial conditions when this is done, so that if we are already on the attractor we will get a fully scaled picture of it without the pull-in path.

If you would like to see this pull-in path just make a copy of line 180 at a new line, 365. You could also experiment at changing the initial conditions defined in this line to investigate the pulling in properties of the attractor.

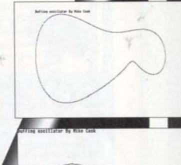
With values of A=0 B=0.2 C=1 F=1.6 you will get a simple spiral out to a circular orbit. It will look elliptical, however, due to the scaling making full use of the screen.

With A=0.4 B=0.3 C=0.1 F=2 there appears to be a slight dent in the final stable orbit. Changing to A=0.5 B=0.41 C=0.5 F=6 produces a very pronounced bump in one end of the orbit. Taking F up to 15 gives a double loop in the bump.

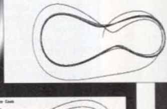
However, with A=1 B=0.3 C=0 F=10 a complex and rich behaviour is exhibited. Perhaps the most interesting effect occurs at A=0.5 B=0.1 C=-8 F=-4. Here there is a very small attractor and the point goes careering around the screen for a long time, eventually ending up in a tight little loop.

Note that it is possible for the path to approach infinity. When this occurs the program terminates with a *Point out of range* message. This is characteristic of an unstable oscillator – we say that the oscillator *locks up*.

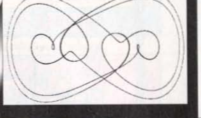
Investigation of this oscillator is best done by altering one parameter of a stable oscillator slightly and seeing what happens. If you tend to guess at random, the chances are that you will get an unstable oscillator.



Duffing oscillator By Mike Cook



Duffing oscillator By Mike Cook



Duffing oscillator By Mike Cook

● *Next month we will look at a universal program for investigating many different types of strange attractor.*

```
   10 REM >DUFFING1
   20 CLS
   30 PRINT"Strange Attractors 2"
   40 PRINT"The Duffing oscillator"
   50 PRINT"By Mike Cook"
   60 PRINT"Defined by - AX^3 + BY + CX
+ F COS(Z)"
   70 PRINT"Press Space Bar to repeat an
d rescale"
   80 PRINT"Press Escape to end"
   90 PRINT"Try A=1  B=0.3  C=0  F=10 to
 start with"
  100 PRINT"Enter the four parameters"
  110 INPUT" A ",A
  120 INPUT" B ",B
  130 INPUT" C ",C
  140 INPUT" F ",F
  150 MODE 0
  160 XSC=130
  170 YSC=60
  180 Z=0:X=-0.1:Y=0.1
  190 D=0.1/25
  200 XMX=0:YMX=0
  210 REPEAT
  220 PRINT TAB(0,0);"Duffing oscillator
 By Mike Cook"
  230 REPEAT
  240 IF ABS(X)>1E6 OR ABS(Y)>1E6 THEN G
OTO 400
  250 IF ABS(X)>XMX THEN XMX=ABS(X)
  260 IF ABS(Y)>YMX THEN YMX=ABS(Y)
  270 PLOT 69,(X*XSC)+640,(Y*YSC)+512
  280 D1=Y
  290 D2=-(A*X*X*X+C*X+B*Y)+F*COS(Z)
  300 X=X+D1*D
  310 Y=Y+D2*D
  320 Z=Z+D
  330 UNTIL INKEY(-99)
  340 REPEAT UNTIL NOT(INKEY(-99))
  350 XSC=640/XMX
  360 YSC=512/YMX
  370 XMX=0:YMX=0
  380 CLS
  390 UNTIL FALSE
  400 PRINT"Point out of range"
```

Get it right ✓

```
 10 =    0 0
 20 = 7A16 6
 30 = B14A 2
 40 = 6B3E 1
 50 = FC23 1
 60 = 21F8 F
 70 = B584 C
 80 = A8D0 6
 90 = 13F1 F
100 = A3CD 0
110 = 2A41 F
120 = F4F0 3
130 = 4E80 C
140 = 3D72 3
150 = 6075 1
160 = B99B E
170 = 2842 E
180 = 7D6C 7
190 = 5701 9
200 = D485 E
210 = BFBA A
220 = 1BB6 9
230 = BFBA D
240 = A008 1
250 = 6671 5
260 = 7910 6
270 = CB10 A
280 = EEED 0
290 = 1EEF 4
300 = 4831 6
310 = 1312 3
320 =  DA0 3
330 = 4CF5 2
340 = EAAA E
350 = EFC9 7
360 = DFB0 8
370 = D485 F
380 = 7A16 3
390 = 226C 4
400 = 8B1F 4
```

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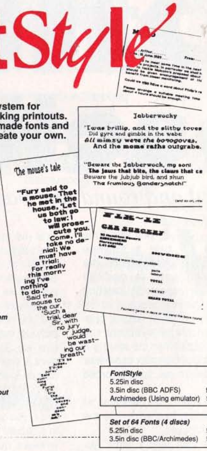

Could we also have a word about Philip's re

Please arrange a suitable meeting time about 4 hours should be enough.

Jabberwocky

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the mome raths outgrabe.

"Beware the Jabberwock, my son!
The jaws that bite, the claws that ca
Beware the Jubjub bird, and shun
The frumious Bandersnatch!"

The mouse's tale

"Fury said to a mouse, That he met in the house, 'Let us both go to law: I will prosecute you. Come, I'll take no denial; We must have a trial: For really this morning I've nothing to do.' Said the mouse to the cur, 'Such a trial, dear Sir, with no jury or judge, would be wasting our breath.'

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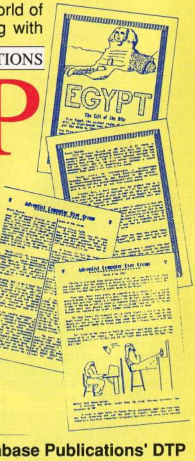

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Database Publications' DTP

5.25in DFS 40/80 track disc (only) £14.95

Due to the complexity of the program the fill routines will not function correctly with the B+, Master or Compact – all other features are compatible

Up tempo tunes

PRIZE letter

BEING a musician I found the music stave printing program from the February issue most useful. But when using it I found that the lines were unevenly spaced – a problem with the printer rather than the program.

I set out to remedy the situation and discovered a much quicker method: Rather than using the bit-image mode I just switched on underlining and printed spaces.

To close the gap between the lines all you need is to adjust the linefeed spacing. This gives the desired effect much more quickly and more accurately. – Andrew Murphy, Brentwood, Essex.

```
 10 REM Faster staves
 20 REM by Andrew Murphy
 30 MODE4
 40 INPUT''"Number of staves",A%
 50 VDU2,1,27,1,45,1,1
 60 VDU1,27,1,49:CLS
 70 FOR N%=1 TO A%
 80 FOR L%=1 TO 5
 90 PRINT STRING$(80," ")
100 NEXT:PRINT''
110 NEXT:VDU3
120 PRINT"Finished..."
```

● It just goes to show how much more effective simple ideas can be.

Corplan can cope

THE review of the Corplan correspondence software in the February issue suggests that the need for 12,800 bytes clear to re-instate the main program "...may be awkward if you consistently create large documents of more than 2,000 words".

To avoid any possible misunderstanding, I should like to explain that the main program is automatically deleted before editing begins or before a selected file is loaded.

It would not normally need to be re-loaded until editing was finished and the document saved to disc. When instructed to load the main program a check is made to see if there is enough room and if not the user is prompted to delete some text until the required space is available. So the length of the main program does not hamper the handling of long documents.

Only the index and two short service programs are kept in memory, and even these can be removed by the operator if necessary.

In fact the two primary design considerations were to protect the users' text from inadvertent deletion and minimising the amount of memory denied to the user. – **Colin Robertson, Corplan Computer Systems, 7A Talbots Drive, Maidenhead, Berks SL6 4LZ.**

Amiga to Acorn

I THOUGHT you would be interested to know how to get Amiga SoundTracker and saved screens across to the Archimedes. All you need is some public domain software, available for both machines, that will read and write to PC discs.

On the Archimedes you can use !PCDir, although the commercial software !PC-Access from Minerva is better, as you can format PC discs as well. !MultiFS is another option.

Just give a blank PC disc to the Amiga owner and he can use his PD software to copy files on to it, then bring it over to the Archimedes and take them straight off.

You can then play the music using !STracker and convert the pictures to Archimedes format using !Translatr.

Copying from an Atari ST is even easier because the file format it identical to PC discs. – **P. Walker, Gillingham, Kent.**

Telephone directory listing

I HAVE a list of 755 seven-letter filenames arranged in alphabetical order and I'd like to print them on my daisywheel printer in four or five columns across the page and reading alphabetically from top to bottom as in a telephone directory.

With my limited knowledge of Basic I have tried without success to accomplish this, and I just can't see the solution which I'm sure must exist. I realise I could re-position the page at the end of each column but I'm sure that's not necessary.

I hope you can help. – **William Kebbell, Stroud, Glos.**

● This is quite an interesting problem which has a very simple solution but does require a bit of lateral thinking, if you'll excuse the pun.

The secret is to construct the page before you print it, which means converting the linear data in your file to a two-dimensional format.

You should start off with a string array containing as many lines as you want printed on the page:

```
10 Lpp% = 60
20 Cols% = 5
30 Width% = 80/Cols%
35 noMore% = FALSE
40 DIM Lines$(Lpp%)
```

Then you need an outer loop that will repeat as long as there are more names and an inner loop for each col-

➤

WANT to write to The Micro User? The addess is: Letters, The Micro User, Europa House, Adlington Park, Macclesfield, SK10 4NP.

Writers of the most interesting letters receive a £10 prize.

How to boost the Arc's business potential

YOU stated in the March issue that "...the Archimedes ... still has a long way to go to becoming a recognised business machine". And my recent experience certainly confirms this.

I am totally convinced that the Arc with Impression II and Laser Direct would provide the cheapest, most appropriate DTP system for the production of our in-house Quality Circle journal. In order to convince my senior colleagues of this fact I tried to arrange for a demonstration.

I called Acorn to find my nearest dealer, and they gave me the names of two. Unfortunately, I discovered that neither kept Acorn products in stock.

In the meantime Acorn had apparently realised their mistake and got a third dealer to contact me. They agreed to do a demonstration but that was before Christmas and as I write (March) we have given up hope.

Computer Concepts, by the way, were very helpful. They offered an incredibly good deal and to demonstrate the system.

Unfortunately the distance was too far for me to take the entire senior staff of our company. So now you appreciate why Acorn products will only ever interest the hobby and education markets until a dealership network is developed that actually stocks the necessary hardware and software and can demonstrate it.

Kelator seem to be leading the way, but where are they? – ***A Manager (name and address supplied).***

umn and another inside that for each line:

```
 50 REPEAT
 60 FOR L% = 1 TO Lpp%
 70 Lines$(L%) = "":NEXT
 80 FOR C% = 1 TO Cols%
 90 FOR L% = 1 TO Lpp%
100 n$ = FNnextName
110 n$ =
LEFT$(n$+STRING$(Widt
h%," "),Width%)
120 Lines$(L%) =
Lines$(L%)+n$
130 IF noMore% THEN L% = Lpp%
140 NEXT:VDU2
150 FOR L% = 1 TO Lpp%
160 PRINT Lines$(L%):NEXT
170 VDU3
180 IF noMore% THEN C% =
Cols%
190 NEXT:VDU2,12,3
200 UNTIL noMore%
210 END
```

This isn't a complete program, you'll have to open the file that holds the filenames and the routine – FNnextName – reads each name, stripping off any leading or trailing spaces.

Also when it's read the last name it sets the variable *noMore%* equal to TRUE. The file will also have to be closed right at the end.

Hard disc dilemma

I RECENTLY upgraded to an A3000 and I'm still discovering. In the near future I want to buy a hard disc but I'm bemused by the different types available and wonder about the compatibility, advantages and disadvantages of one over the other.

PRES advertise their A3K7 and A3K14 hard disc upgrades as being treated as an internal upgrade. What does this mean and does it make any difference?

Could you explain the difference between Acorn's ST506, third party SCSI and Ian Copestake Software's IdeA hard discs?

Why is it that the equivalent hard disc drives for PCs are almost half the price of equivalent ones for the Archimedes? I look forward to your help in this matter. – **Steven Samson, Bushey, Herts.**

● To answer your last question first, it's simply that there's not much demand for Archimedes hard discs, so suppliers can't afford the slim profit margins that PC dealers can live with.

You needn't worry about compatibility, the filing system interface was very carefully designed by Acorn and all properly written software will work happily from anywhere.

Some software quite wrongly assumes that it's running from the ADFS drive zero, but this is the fault of the programmer not the hardware.

Some games fall into this category, but it's easy to get round – although it shouldn't be left to the user to mess around.

As far as the hardware itself is concerned, the ST506 is relatively slow for a hard disc and cannot be mounted internally on the A3000.

In addition, the ADFS software limits the maximum size of hard disc it can use to about 64Mb. This may not seem a big problem, but you'd be surprised how quickly you can fill a hard disc. A typical price for 20Mb is £400.

The PRES comment about it being treated as an internal upgrade refers to the fact that you'll need to buy the plinth as well and the hard disc goes inside that.

As a matter of personal taste the PRES plinth is definitely the most aesthetically pleasing one on the market.

SCSI stands for Small Computers Standard Interface which is used to connect all sorts of peripheral devices to micros. So once you have a SCSI card your interfacing potential is expanded quite a bit.

Hard discs on a SCSI bus can be daisychained, so there's potential for massive storage at over 500Mb per

drive. The disadvantage of SCSI is that for the A3000 everything will be external. A 20Mb drive with interface might cost £450.

Finally the IdeA drives belong to a special standard for hard discs only. These drives tend to be very small and have minimal power consumption which is why Ian Copestake has managed to get one inside the A3000 – where it doesn't really belong.

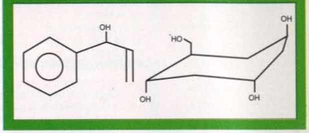
At present the special 2in drives only have a 20Mb capacity and cost £375 but 40Mb and 60Mb drives are on their way. None of the prices mentioned here include VAT.

Chemical structures

I RECENTLY acquired an Archimedes 440 for use with my work and I have been looking for a graphics package that will allow me to draw chemical structures like the two shown here.

The files generated must be able to be imported into Ovation DTP. Is there a package you can suggest? – **Mr. J. Sanvoisin, Durham University.**

● The necessary package came as part of the software provided – !Draw. If you switch from an orthogonal grid to the isometric one it allows structures like this to be drawn extremely easily, and drawfiles can be imported into any DTP software.



Winning at Make 4

IN your magazine it said that the computer was hard to beat in the game Make 4, so I decided I'd work out how to beat it.

After lots of trying I came up with three foolproof methods of winning – but you must go first. The numbers here are the columns you have to play into in order:

```
Level 1: 4 4 4 6 3 5
Level 2: 4 4 4 6 3 7 5
Level 3: 5 4 4 5 2 3 2 2
```

Because the computer always uses the same method to calculate where it should go next, it always makes the same moves in the same board positions. – **Richard Edwards, Littleover, Derby.**

Protection dilemma

AS a teacher I would like to give a resounding welcome to 4Mation's sensible policy of including a free site licence with every piece of Archimedes software bought from them.

Having the !Poster ownership message displayed every time the software is loaded is a small price to pay compared to the three to five times cost that some software houses are charging for site licences.

I believe I'm right in saying that originally their 8 bit software was unprotected and so much was being ripped off that they introduced a sophisticated protection system which meant that the buyer couldn't even make a backup. Which can be a serious problem in schools.

Their move to an identification system was a brave one, and painless to the honest user.

Until everyone is squeaky clean and all software houses feel free to move toward, what I believe, is the Acorn recommendation of no protection on discs, give me the 4Mation identity system plus a free site licence every time to the dongle, colour code, start up with original disc... – **J. P. Thomas, Crowborough, East Sussex.**

●The complaint about 4Mation's protection system was not really centred on the fact that it flashed up an identification message on loading which, as we mentioned, is

➤

We have had many offers of help for M.C. Routledge and his ATPL rom/ram board – but we've lost his address. Could he write in again please?

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

Hard Drive Options From The Serial Port

We produce a range of hard drive upgrade options for the Archimedes range of computers. The controller card can be based either on the **SCSI** or **IDE** interface standards and drives come in many capacities for internal (300/400 series) or external connection. The hard drives used are high quality **Seagate** devices which are all fully guaranteed for one year.

SCSI is becoming the Archimedes 'standard' choice due to the range and number of devices you can connect to the interface - such as tape streamers, scanners printers, CD-ROM drives etc as well as hard drives. Our SCSI package uses our **fast 8-bit interface podule** - also available as an **internal A3000 card** at no extra cost - and Acorn SCSI compatible software.

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	External	**£349**	**External**	**£449**

The Graphics Enhancer

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The Graphics Enhancer adds a new dimension to the graphics capabilities of the Archimedes. Now you can use any 256 colours from a full 24-bit colour palette (16.7 million colours) in the desktop at resolutions up to 768 x 288 on a standard monitor and 832 x 328 on a multi-sync, as well as other modes such 512 x 512 and 640 x 480 thus allowing, for instance, a true 256 grey scale to be obtained. Outside the desktop modes are available using up to 65536 colours. Multiple VIDC clock rates are software selectable and the interface can be controlled by a range of SWI calls and * commands.

For a full specification sheet please contact us.

"Frankly, I think the addition of such a board should be a very high priority. An upgrade equal to adding an ARM 3 board, and cheaper...The Serial Port promises us that the board will be something very special and I am inclined to agree. I think that the Graphics Enhancer will appeal to a massive Archimedes market." **Computer Shopper April 1991**

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common to most professional software on the Apple Mac and PCs. And their policy on free site licences is certainly to be welcomed.

The real complaint related to that question window – which is quite large – appea ing every time a file is loaded or a new document created.

In a school environment you may not be creating and loading new files frequently, but professional users creating, testing and experimenting with different designs when trying to achieve a particular effect may find it irritating.

In addition, Poster *acquires* loading rights to any draw file which is not under the control of the user, and a non-technical (professional) person should have the choice, not be dictated to.

The little devil

MY Diablo 630 daisywheel printer with HyFeed sheet feeder won't cooperate with my BBC Micro when I'm using Inter-Word. The problem is to make it sheet feed to the correct top-set position on the next sheet – the first sheet is always printed without any problems – form feed takes place but never to the right location.

I have tried to enter the software programming as suggested in the HyFeed manual, using Inter-Word's printer set-up menu, but this does not seem to work. I am aware that setting page length and bottom margin to certain values can produce the desired effect but it doesn't seem to work. – **Brian Odurny, Huntley, Glos.**

- Our experience with Diablo printers hasn't included the HyFeed sheet feeder but the details from the manual you sent only refer to ensuring the paper actually feeds through the mechanism correctly.

The first step in evaluating a problem like this is to find out exactly what the printer is doing, create a dummy document printing just a header containing a page number and force two or three pages using the appropriate begin page command, add line numbers as the main text and copy those into each of the pages. Print this document and then line up the individual sheets so that you can see the number of lines of offset, it will almost certainly be the default top margin size of the printer. The main problem with this type of printer is that it's just too intelligent for our good. It's important to clear all top, bottom and side margins to zero and not to use any form of printer control except for style changes.

The vast number of word-processing features available in modern printers is completely unnecessary as the word processors themselves provide most, if not all, of the formatting control. The only thing required nowadays are the different typefaces and styles.

And for machines like the Archimedes you only really need the bit image mode – perhaps someone will produce a direct print dot matrix printer that operates quickly, like Computer Concepts or Calligraph's cheap direct laser printers.

More accurate comparisons

IT was interesting to see Mr. Evans' letter about the accuracy of calculations in the April issue. Of course the accuracy of result is dependent on how the software works rather than the hardware – unless you are using a floating point chip.

BBCBASIC(Z80), as implemented on both the Z88 and on the Torch Z80 second processor for the BBC B, gives an answer of 685090.596, whil PipeDream on the Z88 gives almost the same: 685090.5962.

However the Torch system is capable of better things: Using the Perfect Calc spreadsheet the result is 674510.802960400, almost as close to the hand calculated result as Supecalc 3 and 4. – **E. L. de Bourcier, Leatherhead, Surrey.**

Babbage's Analytical Machine

EVERY March in *The Micro User* we ask you to fill in our Readers Survey so that we can access what you think of the magazine. And it can be quite useful, but with the start of our 100th issue we are creating a new type of feedback column unique to computer magazines.

The Analytical Machine is your chance to vote on the items you liked the most in each issue of *The Micro User* as it goes along. Using this information we can constantly adjust the magazine to fit your requirements.

All you have to do is write down your five favourite items in order on a postcard or the back of an envelope, send them to us and we'll add them up and publish the results the following month.

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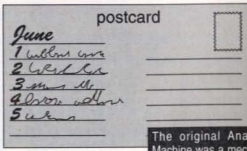
And if the magazine isn't going the way that *you* want, just make sure you register your preferences each month: Remember, your vote does count, and the more results we get the more accurately we can guide the future content of *The Micro User.*

To get things started choose the five items from this issue that you have found the most interesting and list them in order, with the month of the issue, on a postcard or the back of an envelope and send it to: Analytical Machine, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.



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Professional musician Ian Waugh explores a long-awaited new product for the Arc music makers

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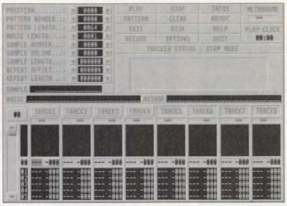
PLAY
STOP
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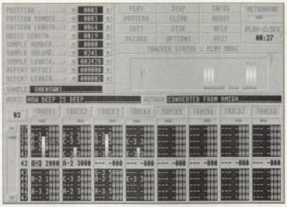
PATTERN
CLEAR
ABOUT
EDIT
DISK
HELP
PLAY-CLOCK
RECORD
OPTIONS
QUIT
TRACKER STATUS : STOP MODE
TRACK1
TRACK2
TRACK3
TRACK4
TRACK5
TRACK6
TRACK7
TRACK8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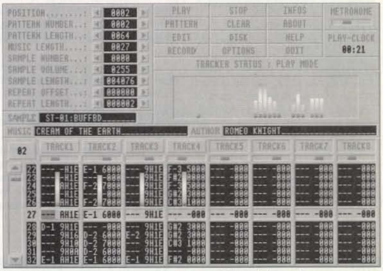
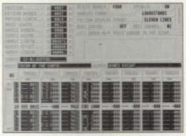
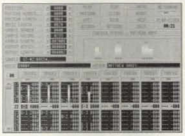
TRACKER STATUS : PLAY MODE
TRACK1
TRACK2
TRACK3
TRACK4
TRACK5
TRACK6
TRACK7
TRACK8

```
PLAY-CLOCK 00:27
SAMPLE UNKNOWN!
MUSIC HOW DEEP IS DEEP          AUTHOR CONVERTED FROM AMIGA
03
42 A-3 2000 A-2 3000 --- -000 --- -000 --- -000 --- -000 --- -000 --- -000
43 --- -000 --- -000 G-3 5000 --- -000 --- -000 --- -000 --- -000 --- -000
44 A-2 1000 C-3 3000 A-3 5000 E-3 3000 --- -000 --- -000 --- -000 --- -000
45 --- -000 --- -000 --- -000 --- -000 --- -000 --- -000 --- -000 --- -000
46 A-3 2000 A-2 3000 A-3 5000 --- -000 --- -000 --- -000 --- -000 --- -000
47 --- -000 --- -000 --- -000 --- -000 --- -000 --- -000 --- -000 --- -000
```


PLAY
STOP
INFOS
METRONOME
PATTERN
CLEAR
ABOUT
EDIT
DISK
HELP
PLAY-CLOCK
RECORD
OPTIONS
QUIT
TRACKER STATUS : PLAY MODE
TRACK1
TRACK2
TRACK3
TRACK4
TRACK5
TRACK6
TRACK7
TRACK8

```
POSITION........: 0002
PATTERN NUMBER..: 0002
PATTERN LENGTH..: 0064
MUSIC LENGTH....: 0027
SAMPLE NUMBER...: 0000
SAMPLE VOLUME...: 0255
SAMPLE LENGTH...: 004076
REPEAT OFFSET...: 000000
REPEAT LENGTH...: 000002
PLAY-CLOCK 00:21
SAMPLE ST-01:BUFFBD
MUSIC CREAM OF THE EARTH          AUTHOR ROMEO KNIGHT
02
22 --- -H1E E-1 6000 --- 9H1E F-3 5000 --- -000 --- -000 --- -000 --- -000
23 --- -H1E --- -000 --- 9H1E F#2 0000 --- -000 --- -000 --- -000 --- -000
24 --- AH1E F-2 7000 --- 9H1E F-3 5000 --- -000 --- -000 --- -000 --- -000
25 --- -H1E --- -000 --- 9H1E G#2 3000 --- -000 --- -000 --- -000 --- -000
26 --- AH1E F-2 7000 --- 9H1E C#3 1000 --- -000 --- -000 --- -000 --- -000
27 --- AH1E E-1 6000 --- 9H1E --- -000 --- -000 --- -000 --- -000 --- -000
28 D-1 9H1E --- -000 --- 9H1E G#2 3000 --- -000 --- -000 --- -000 --- -000
29 --- 9H16 D-2 6000 E-2 9H1E G#2 3000 --- -000 --- -000 --- -000 --- -000
30 --- 9H10 D-2 7000 --- 9H1E C#3 1000 --- -000 --- -000 --- -000 --- -000
31 --- 9H0A D-2 6000 --- 9H1E --- -000 --- -000 --- -000 --- -000 --- -000
32 E-1 AH1E E-1 6000 E-1 9H1E F#2 0000 --- -000 --- -000 --- -000 --- -000
```





Tracker only has one main screen – here are some of the variations on it

WE'VE certainly been waiting long enough for this, haven't we? While Amiga owners (excuse my French) have been creating music with SoundTracker for ages, Archimedes users have been restricted to public domain playback routines.

Now the waiting's over. Tracker allows you to create tunes of your own – and edit foreign files – using not four tracks, like the poor Amiga, but eight.

The sounds it uses are sampled and if you've heard any of the Tracker demos you'll know how impressive they can be.

You can create your own samples with a program like Clares' Armadeus or borrow them from discs of sampled music. But you may not feel the urge to sample immediately, as the Tracker package contains a mammoth collection – more than 100 which fill two discs.

A third disc contains 10 tunes, but most have been converted from the Amiga and none use Tracker's full eight tracks. A fourth disc contains the Tracker program. None of the discs are copy-protected – full marks to The Serial Port.

Tracker installs on the icon bar. It has one main screen which fills the monitor and it doesn't use Risc OS windows. File handling is performed from within the program using its own file routines – no problem, unless you have SCSI or IDE hard discs which you can't access except from the icon bar.

Music entry is numeric. At the bottom of the screen are eight tracks or event lists, each capable of holding 64 events. An event will usually be a note, but it can also be an instruction to control some aspect of the music like volume or tempo. One set of 64 events is a pattern and you can link up to 128 patterns to produce a complete song.

To enter events – music – click on the Edit button. You can now step through the central event bar inserting or editing events.

Notes have a name and octave number in the range 1 to 3 – C-2, F#3 and so on and you enter them by playing the Archimedes' keyboard. If you have a Midi interface and keyboard you can also enter notes from this source. You can do so in step-time, one at a time, or in real-time to a metronome click.

The tricky part is working out where to put the notes to produce a specific rhythm.

To do this you have to calculate the shortest note duration you require. If it's very short, say a sixteenth or 32nd, you would probably make it one event long so two consecutive 16th notes, for example, would occupy two consecutive event positions.

Once you've established your time base, you can enter the tune.

The notes can be followed by an optional four-character command. The first is the number of the sample the note uses. Tracker can hold 36 samples. Once you get past 9, you use the letters of the alphabet to specify

➤

samples 11 to 36.

The second parameter specifies a command instruction and the following two parameters provide data for it. This is the most complex aspect of Tracker you have to understand.

The manual lists the commands but experimentation is really the order of the day – that and a close examination of the demo files.

Commands include Arpeggio which slides the pitch of the note up or down and Portamento which slides the pitch of the instrument (sample) up and down – notice the difference. There are seven stereo positions, too.

There are Crescendo and Decrescendo commands and options to jump to another position in the sequence or to the next Pattern.

You can specify the volume of each note and set the speed of the music. This takes a number between one and &F (15) which actually represents the duration of an event in 50ths of a second.

As you will have gathered, some data is in hex format. The manual includes a decimal-to-hex conversion table but, let's be honest, it's not terribly musical.

To construct a complete song you first create a few Patterns. A simple piece may consist of intro, verse, chorus, middle eight and end Patterns.

Patterns don't have to be 64 events long, they can be shorter. As a sample can carry its own rhythm – a sampled drum pattern, for example – the concept of one event equalling a sixteenth note may go out the window and you may have to adjust the Pattern length to suit the sample.

Loopy samples

In the top left of the screen you can alter the volume of a sample, reduce its length and loop it. Looping is rather a hit and miss affair – as the manual admits – as you have no means of checking the sample's waveform for good looping points.

To link Patterns together, select Song Position number 0 and enter the Pattern number you want to play first. Then select Song Position 1 and another Pattern number and so on.

To help with your song construction swap, cut, copy, paste and mix operations are available from the function keys. The Loading area lets you load and save music, samples and patterns separately although samples are saved along with the song. This can easily create files 300k or more in length.

One niggle. The manual says the name of a sample should appear in the sample slot automatically on loading, but it didn't. And you really have to name the samples in order to keep track of them.

One of the programs on the discs is !Jukebox which must be the latest Tracker playback routine. The Serial Port has placed it in the public domain, so you are free to distribute it.

It won't play old SoundTracker files, but they can be converted by loading into Tracker and saving out again.

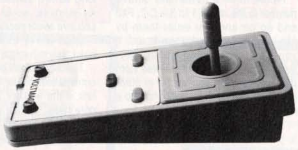
If you want to get the best sound possible out of your Arc plug the Audio Out into your hi-fi. The manual explains how to bypass the rather poor hi pass filter – you do so at your own risk – which will improve the sound quality. The manual covers all the program's functions and includes a Programmer's Reference Section. However, a few more explanations – particularly about the optional event parameters – would have been helpful. And it lacks an index.

It does contain a guide to entering a music score Tracker for the *real* musicians but once you accept the numeracy of the program, operation is not difficult.

One of the nice things about samples is that even one can do far more than half a dozen computer sounds. Tracker is certainly capable of producing impressive results and you can get a lot of music out for relatively little input.

Summing up

Tracker makes few concessions to traditional music form, so musicians of the old school will have to make some adjustments. Hackers will love it and it could well become the de facto standard program for creating Archimedes sound tracks.



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HUM! Why'd they give me a diet program to review? I'm not fat – I'm just too short for my weight. Perhaps my inability, and reluctance, to count calories had something to do with it. Not that I lack willpower!

So many diet books and plans list the calorific content of food and leave it to you to work out how many ounces of different types of scoff are called for.

Have ***you*** ever tried weighing soup or working out how many calories there are in a fried egg?

Diet Manager to the rescue. It tells you the main nutritional components – calories, proteins, carbohydrates, fats and fibre – of the foods which make up a meal and allows you to set targets for them.

Let's get a gripe out of the way first. Although the program is not copy-protected – 10 out of 10 for this – MEWsoft saw fit to remove the save options from the review disc and limit the size of the database. Perhaps they want me to stay cuddly.

The review copy is also labelled a demo copy, but distribution is expressly forbidden, which seems rather pointless. If any of you software houses out there want your proggies reviewing then at least send us the full version!

The program multi-tasks and installs on the icon bar. On opening, two windows appear – the Larder and the Tray. The Larder contains about two dozen icons representing the main food categories (bread, cake, beverage, meat, pasta, soup and so on).

There was a Take Away category but there wasn't an entry for alcohol, although French lager appears under beverages. Doesn't MEWsoft know this is an essential part of every journo's diet?

The tray contains 10 plates. You drag a food icon to one of them and this opens up a food window showing foods of that type which are in the database. You can scroll through them and select one to go *on the plate*.

Click on a plate button and ups pops an Analysis window showing the nutritional components of the food both graphically and numerically. You can select several plates simultaneously to discover the sum total of damage the meal is going to do to your system.

If a particular food looks like adding too many ounces you can wipe it off the plate and try another one. To the right of the plate is the Serving portion which you can edit. As you do so, new nutritional values are shown in the Analysis window. Do you know how many calories are in 99 slices of bread? I do.

Having selected a meal which is both yummy and nutritional, you can save it – in the full version – to salivate over another day.

The meal icon, naturally enough, is a knife and fork. When you load a new meal, the previous totals remain so you can add meals to each other to see what your total intake would be over a day.

Three sample meals are supplied – breakfast, lunch and healthy – with calorific values of 415, 440 and 279 respectively.

You can save the nutritional information of the selected foods as a CSV file – at least you can in the full version – which can be loaded into a word processor, spreadsheet perhaps, !Edit or, as MEWsoft undoubtedly hope, into their Forms Designer. There's also an option to print it out.

You can set target values for the nutritional components in the Analysis window. These appear as a short vertical bar in the horizontal graph display so you can easily see when your selected tuck reaches or passes the target limit.

You can add more food to the Larder database. Details of around 150 foods are supplied. You need to know the nutritional content and weight of a serving of any new food you enter.

The nutritional values supplied are based on what MEWsoft considers to be average values. More information about this appears in some of the comments boxes in the Analysis window. A slice of white bread, for example is assumed to weigh 33 grams.

The manual says you can only enter 10 new items of food each time you run the program, but the data is stored in the Resources directory and you can edit the file directly if you want to add more at the same time.

Currently the manual is supplied on disc. A read-me file confesses a reluctance to produce a printed manual until it has been field tested – on consumers? – but it's fairly short and easy to print. You can even refer to it on-screen as you use the program.

Being unable to save meals, I was unable to test the effectiveness of the program as part of a calorie-controlled diet. That's my story and I'm sticking to it.

The nutritional values were taken from manufacturer's food labels and the manual admits that there is considerable variation between similar products. However, to be 100 per cent accurate you'd have weigh all your food, which is highly impractical.

The strength of the program lies in its database, and its appeal lies in the instant information it gives you about any meal.

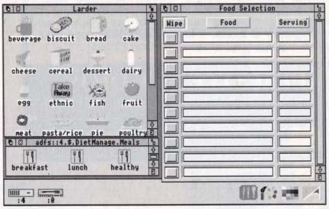
Users will not want to hunt through diet books to discover nutritional components of food, and I'd strongly suggest that MEWsoft greatly expand the database to include all the types of food – and drink – you can buy at Presto's. I mean, there's not even an entry for toast.

Although the author is not a dietitian and absolves himself of responsibility for the way the program is used, I feel it would be a great help if the program included recommended minimum nutritional requirements for different types – male, female, children and so on.

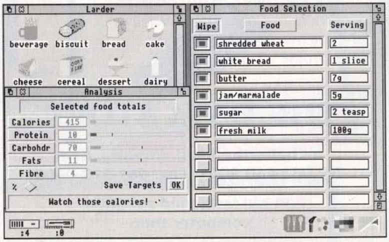
Other than that, lead me to the cottage cheese. Mmm! Loverly!

Summing up

Brilliant! An ideal application for a computer, well-executed. But a more comprehensive database, please. There are 6,732 calories in 99 slices of bread, in case you were wondering.



An empty tray waiting to be filled



Selected food totals

Calories	415
Protein	10
Carbohdr	70
Fats	11
Fibre	4

Watch those calories!

Food	Serving
shredded wheat	2
white bread	1 slice
butter	7g
jam/marmalade	5g
sugar	2 teasp
fresh milk	100g

A healthy breakfast!

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Diary of a game

Steve Parkinson sorts out a dodgy disc drive and continues his sweat blood and tears saga of the writing of an arcade game for the BBC Micro

February

BEGAN work on the local inhabitants of the construction site by coming up with a few designs, first on paper and then on the designer itself.

Unfortunately it is not possible to animate using my sprite – screen – designer, technical and sophisticated though it is. I therefore didn't bother with designing several frames for each character but instead just the one.

All ready to incorporate the new sprites into the game, then disaster struck! The game no longer existed on the disc – with a mad rush of panic I went for my backups: They wouldn't load either. This is not a good start.

All the file names seem to be present and correct, but the file allocation seems to be amiss. Upon deciding that the drive must be mis-aligned – it couldn't even format a new disc – I packed it off to a workshop and, after a few days, treated myself to a brand spanking new, second-hand, three and a half inch drive.

It occasionally showed the same symptoms of the twin drive by machine-gunning every once and a while, but that appears to be due to a bad connector: One wiggle and it's cured.

Didn't want to waste any more time, and set about designing the animation sequences on the normally redundant ST for the previously designed characters. I won't be able to copy the sprites back again, but it gives me a good idea of what I want.

Borrowed a disk drive from The Paul Crawford Hardware and Peripherals Corp and, unsurprisingly, the drive spat the discs out in disgust. Mis-aligned isn't the word. Someone very kindly let me use their disc doctor to salvage what I could. This is extremely embarrasing.

Surgery lasted just over three hours but was well worth it. After scooting back across town, I copied the recovered files to my new drive where they were quite content ... except one. The game file was recovered but is slightly corrupted at regular intervals.

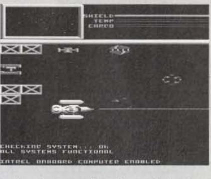
Without wasting any more time – it's cost me over a week already – I got a hard copy of the ragged program and re-typed it. I even managed to solve a couple of previously lingering problems. An afternoon later everything was back to normality.

Set to work re-drawing the sprites on the Beeb from the ST. It's a bit difficult, as the resolution and colour palettes differ a teensy bit between 16 and 8 bits.

While I was at it I also drew up a numerical character set which will be used to add that popular time element to your mission.

Wrote a quick routine to animate the new sprites, so I can get all the animation speeds and lengths right before I do the real thing. I've designed the workers, mine probes and general pests – which have no purpose except to make your life difficult.

Incorporated the animation sequence, which appears to have been received quite well as the game doesn't seem to be struggling at all, although underneath I think its only a matter of time before the CPU decides it's taken on too much and starts slowing down.



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The next stage of development was to set the objects in motion. This was a simple routine which simply shifted the objects away from the transporter on an unchanging course. No intelligence yet, but I'm certain that only a small amount will be necessary to maintain the realism.

Wasn't impressed by the end result of this simple routine, as the objects seem to have taken on some kind of disappearing act. It wasn't long after this that I discovered an old error in the *print-sprite* routine.

It was in December that I sorted out this routine and made it calculate the X-Y positions only when the sprites were in the screen area. Unfortunately part of the old routine was also there.

Actually a bit fortunate really, because this frees up an additional two whole bytes of data for each object in the universe! Brilliant!

Also made another slight change to some existing routines. Instead of having it easy and holding down the Return key all the time, i've changed it to a one-press, one-shot system.

In case you're worried about the state of your keyboard, it doesn't take too much more effort to open fire, but it does keep you on your toes! Besides, an autofire option will be a common item to salvage.

Decided after a bit of thought that if I find no other use for the two remaining bytes of data per object they will be used to decide both the animation speed and frame length of each object – I was going to use a separate look-up table for these – and the other to decide how much more damage can be sustained by an object before it is eliminated.

This will be an important factor on higher levels, as the inhabitants will become more resistant to being shot and therefore harder to destroy.

Began setting the borders for the aliens. I originally intended them to exist only on the screen and, once they were off, they would be gone and that was that. Don't know about you, but I find this extremely irritating.

At the other extreme I could keep all the aliens running all of the time, like the rocks, but this too seems pointless as there is no need to keep track of them continuously.

This means that a separate border is needed for the aliens. It will extend well beyond the realms of the screen, but once they have reached the border they are eliminated and a new alien is generated elsewhere.

I appear to be running headlong into March, but there was time for me to consider the algorithm which decides where the newly generated aliens will be placed once the previous ones are eliminated. The positions will be based upon your current direction, which will give the effect of a very busy universe indeed.

● *Well, not as much work done as I anticipated, but that's the way it is. The new disc drive is behaving itself and leads the way to what hopefully will turn out to be a very productive March. Still, there are those questions: Has the machine-gunning drive really exhausted itself of ammunition? Or is the monitor next on the Digital Destruction list? Keep reading!*

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AFT SHIELD OUT

WHITE MAGIC
START AT OTHER END!
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The Real McCoy 2

This 4 game collection really is The Real McCoy. These are genuine top games in their original format with full instructions. The games have been carefully selected and include a massive 3D mega game, an arcade isometric game and 2 quite different multi-player sports games. Bought individually they would cost £89.80p making this a very prestigious special edition collection.

APOCALYPSE (R.R.P. £29.95)

Apocalypse was written especially for the Archimedes by Gordon Key. It places you on the surfaces of varied futuristic hostile planets colonised by very varied but always ruthless enemies. In your highly advanced and extremely fast and manoeuvrable craft you must find your way around the increasingly massive planets and systematically annihilate the enemy.

"Simply, this is the best release yet for the Arc by absolutely miles. Stunning graphics, stunning sound and masses of action. Brilliant."....Risc User

(R.R.P. £19.95) HOLED OUT

Holed Out is a superb 3D golf game also written by Gordon Key. Whether you're young or old, male or female, beginner or professional Holed Out has been designed especially for you. Features include: 2 contrasting courses, 1 to 6 players, excellent 3D graphics and sound effects, full set of accurately defined clubs, slice/hook capabilities etc. etc..

"...it is quite a stunning piece of work.".... The Micro User

"...I play golf and this is the nearest thing I've seen to the real game on a computer. The graphics are very good with a large scale golfer complete with bag and trolley (and a good swing!) and the sounds are very realistic."....Archive

THE OLYMPICS (R.R.P. £19.95)

The Olympics can be played by 1 to 8 players and is comprised of 6 main events: Diving, Shooting, Javelin, Swimming, Canoeing and Pole Vault. It contains a superb piece of music, opening and closing ceremonies and 14 national anthems.

"Compilation packages of sporting events may have been round on other machines for ages but the first one for the Arc is every bit as good.... VERDICT: A Gold Medallist."....A&B Computing (Now Archimedes World)

"Excellent graphics.... Classy presentation.... and plenty of variety.... Should find favour with all members of the family. Definitely recommended."....Risc User

(R.R.P. £19.95) INERTIA

Inertia is a totally original game with beautiful graphics and superb digitised sound effects and music. There are 2 massive and varied landscapes to be explored and many special tiles to be collected. Your craft floats freely around the landscapes and you must exert forces upon it to guide its speed and direction. Full colour 3 dimensional maps of the 2 landscapes can be viewed at any time and are a joy just to wander around.

".... the accompanying music is superb....Inertia is another reasonably priced game for all ages. Highly recommended."....The Micro User

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SUPERIOR SOFTWARE

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SPEECH!

Give Your Computer a Voice

SPEECH! works entirely in software, no extra hardware whatsoever is required, and has an unlimited vocabulary. The program has a built-in parser which translates English words into phonemes, so it can directly speak words you input or text files. The phonemes can be used directly if you wish, so stress and intonation can be added as required and even foreign languages can be spoken. SPEECH! includes a user-friendly spelling program, which can be easily changed to include your own words.

The new A3000/Archimedes version of SPEECH! is fully RISC OS compatible and allows multitasking in Desktop. You can vary the pitch, speed, volume, and voice, both directly and in your own text files and programs, and can even 'sing' words over a four octave range! The A3000/Archimedes version also includes a program so you can alter the dictionary yourself.

BBC Micro/Master & A3000/Archimedes

MASTER BREAK

Snooker-Style Trivia Quiz Game for 1 to 4 Players

Six categories of questions: SCIENCE & NATURE, POP MUSIC, GEOGRAPHY, SPORTS & PASTIMES, ARTS and HISTORY. Over 1500 questions in the BBC Micro/Electron version. Over 2000 questions in the A3000/Archimedes version, including digitised picture and digitised sound questions.

In the 1 player game, try to get the highest break - you might even manage the maximum break of 147. In the 2 to 4 player game, compete against your friends and family for the highest score and highest break.

Start your frame with an easy red question, then choose your colour - have you the nerve to choose the black ball question? You've used all your PASSES and the ball is OVER THE POCKET - if you miss, it's a FOUL SHOT!

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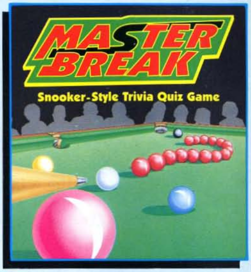
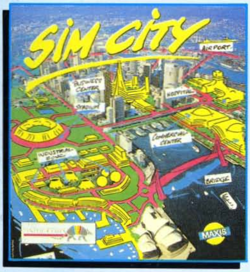
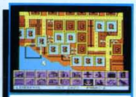
Black Ball on Science & Nature

BBC Micro/Master

A3000/Archimedes







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BBC Micro/Master & Electron

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